

August 2, 2010

Mr. Kenneth Bardo - LU-9J  
U.S. EPA Region V  
Corrective Action Section  
77 West Jackson Boulevard  
Chicago, IL 60604-3507

VIA FEDEX

Re: Long-Term Monitoring Program  
Evaluation of 3Q08 - 2Q10 Data  
Solutia Inc., W. G. Krummrich Plant, Sauget, IL

Dear Mr. Bardo:

As noted when the 2<sup>nd</sup> Quarter 2010 Data Report for the subject program was submitted July 22, enclosed please find a report evaluating all of the long-term monitoring data collected from 3<sup>rd</sup> quarter 2008 through 2<sup>nd</sup> quarter 2010, i.e., since the February 2008 Final Decision, and making recommendations for changes going forward. Reiterating those recommended changes from the enclosed report:

- reduce groundwater sampling frequency from quarterly to semiannually during the first and third quarters of each year;
- eliminate sampling and analysis for semivolatile organic compounds (specifically 4-chloroaniline, 2-chlorophenol, 1,4-dioxane, and 1,2,4-trichlorobenzene) in the five Benzene Storage Area (BSA) monitoring wells; and
- discontinue phospholipid fatty acids (PLFA) analyses and compound-specific isotope analyses (stable isotope probing [SIP]).

In addition, Solutia proposes to discontinue semiannual sampling of surface water and sediment from the Mississippi River for volatile and semivolatile organic compounds. As demonstrated by the attached tables of all such data collected from 3<sup>rd</sup> quarter 2008 through 2<sup>nd</sup> quarter 2010, there was only one detection (72 ug/kg chlorobenzene in R-3 sediment during 3<sup>rd</sup> quarter 2009) out of 216 possibilities (2 media x 3 sample locations x 9 analytes x 4 sampling events), and that was suspect, given corresponding results from 3<sup>rd</sup> quarter 2008 (4.4J < 4.8 ug/kg), 1<sup>st</sup> quarter 2009 (2.9J < 4.4 ug/kg), and

1<sup>st</sup> quarter 2010 (< 5 ug/kg) were less than detection limits. Furthermore, including the two estimated (J) detections just noted, there were only six total estimated detections.

I'd appreciate your prompt response because the 3<sup>rd</sup> quarter 2010 sampling is scheduled to take place this month.

If you have any questions or comments regarding this report, please contact me at (314) 674-3312 or [gmrina@solutia.com](mailto:gmrina@solutia.com)

Sincerely,

A handwritten signature in black ink, appearing to read "Gerald M. Rinaldi", written in a cursive style.

Gerald M. Rinaldi  
Manager, Remediation Services

Attachment and Enclosure

cc: Distribution List



## **DISTRIBUTION LIST**

**Long-Term Monitoring Program  
Evaluation of 3Q08 - 2Q10 Data  
Solutia Inc., W. G. Krummrich Plant, Sauget, IL**

### **USEPA**

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USEPA Region 5 - SR6J, 77 West Jackson Boulevard, Chicago, IL 60604**

### **IEPA**

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### **Booz Allen Hamilton**

**Dan Briller  
Booz Allen Hamilton, 8283 Greensboro Drive, McLean, VA 22102**

### **Solutia**

**Justin Prien                      500 Monsanto Avenue, Sauget, IL 62206-1198**

# Results of Long-Term Monitoring of SURFACE WATER

| ID  | Media         | Units | Chemical Group | Chemical               | 3rd Quarter 2008 | 1st Quarter 2009 | 3rd Quarter 2009 | 1st Quarter 2010 |
|-----|---------------|-------|----------------|------------------------|------------------|------------------|------------------|------------------|
|     |               |       |                |                        | Result           | Result           | Result           | Result           |
| R-1 | Surface Water | ug/L  | VOCs           | Benzene                | < 1              | < 1              | < 1              | < 1              |
| R-1 | Surface Water | ug/L  | VOCs           | Chlorobenzene          | < 1              | < 1              | < 1              | < 1              |
| R-1 | Surface Water | ug/L  | VOCs           | 1,2-Dichlorobenzene    | < 1              | < 1              | < 1              | < 1              |
| R-1 | Surface Water | ug/L  | VOCs           | 1,3-Dichlorobenzene    | < 1              | < 1              | < 1              | < 1              |
| R-1 | Surface Water | ug/L  | VOCs           | 1,4-Dichlorobenzene    | < 1              | < 1              | < 1              | < 1              |
| R-1 | Surface Water | ug/L  | SVOCs          | P-Chloroaniline        | < 19             | < 19             | < 19             | < 19             |
| R-1 | Surface Water | ug/L  | SVOCs          | 2-Chlorophenol         | < 9.7            | < 9.7            | < 9.5            | < 9.4            |
| R-1 | Surface Water | ug/L  | SVOCs          | 1,4-Dioxane            | < 9.7            | < 9.7            | < 9.5            | < 9.4            |
| R-1 | Surface Water | ug/L  | SVOCs          | 1,2,4-Trichlorobenzene | < 9.7            | < 9.7            | < 9.5            | < 9.4            |
| R-2 | Surface Water | ug/L  | VOCs           | Benzene                | < 1              | < 1              | < 1              | < 1              |
| R-2 | Surface Water | ug/L  | VOCs           | Chlorobenzene          | < 1              | < 1              | < 1              | < 1              |
| R-2 | Surface Water | ug/L  | VOCs           | 1,2-Dichlorobenzene    | < 1              | < 1              | < 1              | < 1              |
| R-2 | Surface Water | ug/L  | VOCs           | 1,3-Dichlorobenzene    | < 1              | < 1              | < 1              | < 1              |
| R-2 | Surface Water | ug/L  | VOCs           | 1,4-Dichlorobenzene    | < 1              | < 1              | < 1              | 0.36 J           |
| R-2 | Surface Water | ug/L  | SVOCs          | P-Chloroaniline        | < 19             | < 19             | < 19             | < 19             |
| R-2 | Surface Water | ug/L  | SVOCs          | 2-Chlorophenol         | < 9.7            | < 9.7            | < 9.5            | < 9.4            |
| R-2 | Surface Water | ug/L  | SVOCs          | 1,4-Dioxane            | < 9.7            | < 9.7            | < 9.5            | < 9.4            |
| R-2 | Surface Water | ug/L  | SVOCs          | 1,2,4-Trichlorobenzene | < 9.7            | < 9.7            | < 9.5            | < 9.4            |
| R-3 | Surface Water | ug/L  | VOCs           | Benzene                | < 1              | < 1              | < 1              | < 1              |
| R-3 | Surface Water | ug/L  | VOCs           | Chlorobenzene          | < 1              | < 1              | < 1              | < 1              |
| R-3 | Surface Water | ug/L  | VOCs           | 1,2-Dichlorobenzene    | < 1              | < 1              | < 1              | < 1              |
| R-3 | Surface Water | ug/L  | VOCs           | 1,3-Dichlorobenzene    | < 1              | < 1              | < 1              | < 1              |
| R-3 | Surface Water | ug/L  | VOCs           | 1,4-Dichlorobenzene    | < 1              | < 1              | < 1              | 0.37 J           |
| R-3 | Surface Water | ug/L  | SVOCs          | P-Chloroaniline        | < 19             | < 19             | < 19             | < 19             |
| R-3 | Surface Water | ug/L  | SVOCs          | 2-Chlorophenol         | < 9.7            | < 9.7            | < 9.5            | < 9.4            |
| R-3 | Surface Water | ug/L  | SVOCs          | 1,4-Dioxane            | < 9.7            | < 9.7            | < 9.5            | < 9.4            |
| R-3 | Surface Water | ug/L  | SVOCs          | 1,2,4-Trichlorobenzene | < 9.7            | < 9.7            | < 9.5            | < 9.4            |

## Notes:

ug/L = micrograms per liter

< = Result is non-detect, less than the reporting limit

J = Estimated Value

NA = Not Analyzed

**BOLD** indicates concentration greater than the reporting limit

# Results of Long-Term Monitoring of SEDIMENT

| ID  | Media    | Units | Chemical Group | Chemical               | 3rd Quarter 2008 | 1st Quarter 2009 | 3rd Quarter 2009 | 1st Quarter 2010 |
|-----|----------|-------|----------------|------------------------|------------------|------------------|------------------|------------------|
|     |          |       |                |                        | Result           | Result           | Result           | Result           |
| R-1 | Sediment | ug/kg | VOCs           | Benzene                | < 4.6            | < 13             | < 5.3 J          | < 4.7            |
| R-1 | Sediment | ug/kg | VOCs           | Chlorobenzene          | < 4.6            | < 13             | < 5.3 J          | < 4.7            |
| R-1 | Sediment | ug/kg | VOCs           | 1,2-Dichlorobenzene    | < 4.6            | < 13             | < 5.3 J          | < 4.7            |
| R-1 | Sediment | ug/kg | VOCs           | 1,3-Dichlorobenzene    | < 4.6            | < 13             | < 5.3 J          | < 4.7            |
| R-1 | Sediment | ug/kg | VOCs           | 1,4-Dichlorobenzene    | < 4.6            | < 13             | < 5.3 J          | < 4.7            |
| R-1 | Sediment | ug/Kg | SVOCs          | P-Chloroaniline        | < 840            | < 930            | < 840            | < 810            |
| R-1 | Sediment | ug/Kg | SVOCs          | 2-Chlorophenol         | < 420            | < 470            | < 420            | < 410            |
| R-1 | Sediment | ug/Kg | SVOCs          | 1,4-Dioxane            | < 420            | < 470            | < 420 J          | < 410            |
| R-1 | Sediment | ug/Kg | SVOCs          | 1,2,4-Trichlorobenzene | < 420            | < 470            | < 420            | < 410            |
| R-2 | Sediment | ug/kg | VOCs           | Benzene                | < 4.9            | < 4.8            | < 4.9            | < 5              |
| R-2 | Sediment | ug/kg | VOCs           | Chlorobenzene          | < 4.9            | < 4.8            | < 4.9            | < 5              |
| R-2 | Sediment | ug/kg | VOCs           | 1,2-Dichlorobenzene    | < 4.9            | < 4.8            | < 4.9            | < 5              |
| R-2 | Sediment | ug/kg | VOCs           | 1,3-Dichlorobenzene    | < 4.9            | < 4.8            | < 4.9            | < 5              |
| R-2 | Sediment | ug/kg | VOCs           | 1,4-Dichlorobenzene    | < 4.9            | < 4.8            | < 4.9            | < 5              |
| R-2 | Sediment | ug/Kg | SVOCs          | P-Chloroaniline        | < 800            | < 790            | < 810            | < 780            |
| R-2 | Sediment | ug/Kg | SVOCs          | 2-Chlorophenol         | < 400            | < 390            | < 400            | < 390            |
| R-2 | Sediment | ug/Kg | SVOCs          | 1,4-Dioxane            | < 400            | < 390            | < 400            | < 390            |
| R-2 | Sediment | ug/Kg | SVOCs          | 1,2,4-Trichlorobenzene | < 400            | < 390            | < 400            | < 390            |
| R-3 | Sediment | ug/kg | VOCs           | Benzene                | < 4.8            | < 4              | 3.5 J            | < 5              |
| R-3 | Sediment | ug/kg | VOCs           | Chlorobenzene          | 4.4 J            | 2.9 J            | 72               | < 5              |
| R-3 | Sediment | ug/kg | VOCs           | 1,2-Dichlorobenzene    | < 4.8            | < 4              | < 4.7            | < 5              |
| R-3 | Sediment | ug/kg | VOCs           | 1,3-Dichlorobenzene    | < 4.8            | < 4              | < 4.7            | < 5              |
| R-3 | Sediment | ug/kg | VOCs           | 1,4-Dichlorobenzene    | < 4.8            | < 4              | 1.6 J            | < 5              |
| R-3 | Sediment | ug/Kg | SVOCs          | P-Chloroaniline        | < 660            | < 810            | < 730            | < 770            |
| R-3 | Sediment | ug/Kg | SVOCs          | 2-Chlorophenol         | < 340            | < 400            | < 360            | < 390            |
| R-3 | Sediment | ug/Kg | SVOCs          | 1,4-Dioxane            | < 340            | < 400            | < 360 J          | < 390            |
| R-3 | Sediment | ug/Kg | SVOCs          | 1,2,4-Trichlorobenzene | < 340            | < 400            | < 360            | < 390            |

## Notes:

µg/Kg = micrograms per kilogram

< = Result is non-detect, less than the reporting limit

J = Estimated Value

NA = Not Analyzed

**BOLD** Indicates concentration greater than the reporting limit

Date: July 29, 2010  
To: Jerry Rinaldi - Solutia Inc.  
cc: Bob Billman – URS Corporation, St. Louis  
From: Wade A. Narin van Court, P.E. –  
URS Corporation, Hallowell, Maine  
Subject: **2<sup>nd</sup> Quarter 2010 Evaluation of the Long-Term Monitoring Program  
at the W. G. Krummrich Facility**

## 1.0 INTRODUCTION

The U.S. Environmental Protection Agency (USEPA) issued a Final Decision on February 26, 2008, regarding remediation of impacted groundwater originating from Solutia Inc. (Solutia)'s W. G. Krummrich Facility located in Sauget, Illinois, and hereafter referred to as "the Site." The Final Decision called for a plan to evaluate the effectiveness of monitored natural attenuation (MNA) in controlling two groundwater plumes emanating from beneath the Site, one originating from a former benzene storage area (BSA) that contains dissolved benzene (referred to as the BSA Plume) and one originating below a former chlorobenzene process area (CPA) that contains dissolved chlorobenzenes (referred to as the CPA Plume). Downgradient of the source areas, the plumes appear to be co-mingled.

A Long-Term Monitoring Program (LTMP) work plan was developed by URS to generate data that could be used to assess whether the plumes are naturally attenuating. The activities implemented under the work plan include collecting quarterly groundwater samples from five monitoring wells located along the alignment of the BSA Plume (i.e., monitoring wells BSA-MW-1S, BSA-MW-2D, BSA-MW-3D, BSA-MW-4D, and BSA-MW-5D) and from five wells located along the alignment of the CPA Plume (i.e., monitoring wells CPA-MW-1D through CPA-MW-5D) using low-flow sampling techniques. Indicator parameters monitored during purging of the wells using a flow cell include pH, temperature, specific conductance, redox potential, and dissolved oxygen. Groundwater samples collected during the sampling events are analyzed for the following parameters: benzene, monochlorobenzene (CB), dichlorobenzene (DCB) isomers (1,2-DCB, 1,3-DCB and 1,4-DCB) 1,2,4-trichlorobenzene, total and dissolved organic carbon, total and dissolved iron and manganese, nitrate, sulfate, dissolved gases (i.e., carbon dioxide, ethane, ethylene, and methane), chloride, alkalinity, phospholipid fatty acids, and microorganism community structure. Selected samples were also analyzed for 2-chlorophenol (all wells), 4-chloroaniline (wells CPA-MW-3D, CPA-MW-4D, and CPA-MW-5D), and 1,4-dioxane (wells BSA-MW-2D, BSA-MW-3D, BSA-MW-4D, and BSA-MW-5D) on a semi-annual basis. In addition to these parameters, samples collected from wells BSA-MW-2D and CPA-MW-3D were analyzed by compound-specific isotope analysis (CSIA), which can provide direct evidence of biodegradation of a particular constituent of interest.<sup>1</sup> The supporting data used for this evaluation are presented in **Attachment A**.

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<sup>1</sup> CSIA is performed by deploying a biotrap (a Stable Isotope Probe [SIP]) in a well that is screened within a plume. The biotrap was baited with the constituents of interest (in this case benzene and CB) that have been labeled with carbon 13 (13C). After a period of time, the trap is retrieved and the biomass that accumulates on the trap is analyzed for 13C. If the biomass is enriched with 13C, it can be concluded with certainty that microorganisms within the aquifer around the well are biodegrading the constituent of interest.

**Figure 1** shows the Site, the area of interest extending from the Site westward (i.e., hydraulically downgradient) to the Mississippi River, the locations of the BSA and CPA, and the monitoring wells used to delineate and characterize the BSA and CPA Plumes.

According to the LTMP work plan dated May 2009, the effectiveness of MNA is to be evaluated after completing one year and two years (i.e., four quarters and eight quarters) of sampling. An interim evaluation was submitted in October 2009 after the 2<sup>nd</sup> quarter 2009 (2Q09) event, the fourth such event following the February 2008 Final Decision. As of the 2Q10 event, two years of quarterly LTMP monitoring (eight monitoring events) has been completed. This memorandum provides an assessment of these data with respect to demonstrating the occurrence of MNA of benzene and chlorobenzenes in groundwater.

According to the LMTP work plan, MNA of the BSA and CPA plumes is to be evaluated based upon the following:

1. A demonstration of a clear and meaningful trend of decreasing contaminant mass or concentration;
2. An indirect demonstration of the types and rates of natural attenuation processes active at the Site; and
3. Direct evidence of the occurrence of biodegradation processes at the Site.

The assessment presented in this memorandum is focused specifically on the following constituents of interest (COI): benzene and chlorobenzenes (CB and DCB isomers). Following a brief review of the relevant background information at the Site in **Section 2.0** and the properties and natural attenuation mechanisms of the COI in **Sections 3.0** and **4.0**, the evaluation of MNA at the Site, based upon the data collected to date, is presented in **Section 5.0**. Conclusions and recommendations are presented in **Sections 6.0** and **7.0**, respectively.

## **2.0 RELEVANT BACKGROUND INFORMATION**

A number of investigations had been performed to characterize the Site and the groundwater plumes downgradient from the Site prior to starting the current LTMP to evaluate MNA. In particular, these investigations obtained data used to determine the aquifer characteristics and existing hydrogeologic conditions, and to assess the extent of the BSA and CPA Plumes. The existing information relevant to the evaluation of MNA is discussed in the following sections.

### **2.1 AQUIFER CHARACTERISTICS**

Aquifer characteristics need to be considered when evaluating MNA. For example, groundwater velocities, which are determined by hydraulic properties, e.g., hydraulic conductivity and effective porosity, are used to calculate attenuation rate constants, as described later in this memorandum.

Based on the description from the Technology Selection Report (Booz Allen Hamilton, 2007), soils beneath the Site consist of poorly-sorted fine and medium sands with traces of silt and gravel and occasional clay lenses. In the Site vicinity, depth to bedrock is approximately 110 feet below the

ground surface (bgs), and approximately 140 feet below the crest of 30-foot high levees along the banks of the Mississippi River.

Three distinct hydrologic units have been identified in the unconsolidated soil which, downward from the ground surface, are the shallow hydrologic unit (SHU), the medium hydrologic unit (MHU) and the deep hydrologic unit (DHU). The SHU is approximately 30 feet thick; the MHU and DHU are each approximately 40 feet thick and are similar in composition. With the exception of BSA source area well BSA-MW-1S, the wells monitored for MNA parameters are screened in the DHU. Based upon the similarity in grain-size composition, aquifer properties for SHU, MHU and DHU were assumed to be similar for this MNA evaluation. The aquifer properties used in the analyses of MNA are summarized in Table 1.

| Table 1: Typical Soil Properties           |   |
|--|---|
| Soil Property                              | Value Used in MNA Evaluation Analyses<br>(Source: URS, 2008 unless noted) |
| Hydraulic Conductivity (K)                 | $1.75 \times 10^{-2}$ centimeters per second (cm/sec)                     |
| Hydraulic Gradient (i)                     | 0.0014 feet/foot (BSA Plume)<br>0.0013 feet/foot (CPA Plume)              |
| Bulk Density ( $\rho_b$ , dry unit weight) | 118.3 pounds per cubic foot<br>(1,895 kilograms per cubic meter)          |
| Porosity (n)                               | 28.8%   |
| Effective Porosity ( $n_e$ )               | 20% (Env. Tech., 1997)  |
| Fraction Organic Carbon ( $f_{oc}$ )       | 0.0016  |

## 2.2 SITE HYDROGEOLOGY

Hydrogeologic conditions are also an important consideration when evaluating MNA. Site data were reviewed to develop an understanding of the hydrogeologic conditions that could influence the interpretation of the occurrence and extent of MNA. Relevant hydrogeologic conditions at the Site are briefly discussed below.

An important hydrologic feature that affects groundwater flow beneath the Site is the Mississippi River, which is interpreted to typically be the groundwater discharge point for all three hydrologic units. However, the groundwater that discharges into the Mississippi River is not adversely affecting water quality, based on the results of past and ongoing surface water and sediment sampling.

Since Spring 2006<sup>2</sup>, the stage of the Mississippi River downgradient of the Site has varied over 30 feet, from an approximate elevation of 380 feet mean sea level (MSL) to 410 feet MSL. During periods when the stage is raised (i.e., generally above elevation 390 feet MSL), it has been observed to be higher than groundwater levels in the MHU and/or DHU immediately adjacent to the river and appears to be a source of recharge to the MHU and DHU groundwater systems during these high river stages. As such, the Mississippi River may provide a source for electron acceptors (e.g., nitrate) during these periods. In addition, higher water levels may mobilize sulfate, which may serve as an electron acceptor during biodegradation of COI, from the vadose zone into groundwater.

<sup>2</sup> The first quarterly event for the Plume Stability Monitoring Program occurred in March 2006.

Additionally, hydraulic gradients occur in three dimensions (i.e., groundwater flows laterally and vertically in space), and vertical hydraulic gradients, as well as the horizontal hydraulic gradients, affect the transport of COI in the groundwater at the Site. To illustrate the effect of the vertical gradients, groundwater equipotential contours were developed for two cross-sections extending along the axes of the CPA and BSA Plumes. The groundwater equipotential contours are presented as cross-section A-A' (**Figure 2**) for the CPA Plume and cross-section B-B' (**Figure 3**) for the BSA Plume. These equipotential contours indicate that, under typical groundwater flow conditions, there is a downward hydraulic gradient in the vicinity of the Site and to the east, and there is an upward hydraulic gradient adjacent to the Mississippi River. Based on the equipotential contours, the likely flowpaths for the COI from the source areas to the river are shown on **Figures 2 and 3**.

One final consideration that may affect the transport of COI from the CPA and BSA is the Groundwater Migration Control System (GMCS) installed at Sauget Superfund Site R, which is adjacent to the Mississippi River and southwest of the Site. The GMCS consists of a three-sided vertical barrier and groundwater extraction wells. The barrier is keyed into the underlying bedrock and open to the west, so groundwater from impacted areas to the east are intercepted while the amount of river water intercepted by the extraction wells is minimized. During normal river conditions, the extraction pumps operate to create a groundwater gradient that captures groundwater flow into the GMCS from the east.

## 2.3 EXTENT OF THE BSA AND CPA PLUMES

The results of the previous investigations at the Site indicate that there is no trend in the concentrations of benzene, CB, and DCB at the lateral edges of the plumes (i.e., in monitoring wells PSMW-2, PSMW-6, PSMW-9, PSMW-10, PSMW-13, and PSMW-17). Furthermore, the COI concentrations appear to be generally stable (i.e., the plume is not expanding at its margins). At PS-MW-01, upgradient of the Site, there appears to be an increasing trend in the benzene concentration. This indicates that there may be a source of benzene present upgradient of the BSA and CPA (i.e., offsite). Vertical groundwater equipotential contours presented on **Figures 2 and 3** indicate that the upgradient source of benzene may be contributing to groundwater impacts in the CPA and/or BSA plume area.

## 3.0 PROPERTIES OF CONSTITUENTS OF INTEREST AND NATURAL ATTENUATION

The COI that are the focus of this MNA evaluation include benzene, CB, and DCB (total and its isomers).

Natural attenuation involves a reduction of the concentration and/or mass of a given COI in groundwater through several processes that can include the following:

- **Dispersion** – a reduction in concentration of a COI as a result of the expansion of a plume during advective transport;
- **Dilution** – a reduction in concentration of a COI generally through recharge over the area of the plume or due to mixing with clean groundwater;
- **Sorption** – a reduction in the dissolved concentration of a COI through sorption to organic carbon or metallic oxides on mineral surfaces in soil matrix or bedrock fractures;

- **Volatilization** – a reduction in the dissolved or sorbed concentration of a COI due to partitioning (diffusion) from soil or groundwater into soil vapor;
- **Chemical Transformation** – a reduction in concentration and mass of a constituent of interest through abiotic processes such as hydrolysis; and
- **Biodegradation** – a reduction of both the mass and concentration of a COI through biologically mediated reactions that are facilitated by native microorganisms living on the soil. Biodegradation is the primary attenuation mechanism that results in the destruction of organic compounds and a reduction in contaminant mass.

The vast majority of these processes are, in all likelihood, contributing to MNA of the plumes.

Chemical properties of the COI that may affect the natural attenuation processes described above include Henry's Law Constant (volatilization), along with solubility and organic carbon partitioning coefficients (sorption and biodegradation). For the COI being evaluated, these properties are summarized in **Table 2**. Following is a general discussion of these data and their importance to natural attenuation processes.

| <b>Table 2: Chemical Properties for COI</b><br>(Sources: ATSDR Toxicological Profiles) |                                      |   |   |   |
|--|--------------------------------------|---|---|---|
| <b>Constituent of Interest</b>   | <b>Density</b><br>(grams/milliliter) | <b>Henry's Law Constant</b><br>(atmospheres-cubic meters/mole at 25 °C) | <b>Solubility</b><br>(milligrams/liter [mg/l] at 20 °C) | <b>Organic Carbon Partitioning Coefficient</b><br>( $K_{oc}$ , liters/kilogram) |
| Benzene  | 0.8787 at 15 °C                      | $5.5 \times 10^{-3}$  | 1,880   | 58.9  |
| CB   | 1.1058 at 20 °C                      | $3.58 \times 10^{-3}$   | 500   | 219   |
| 1,2-DCB  | 1.3059 at 20 °C                      | $1.92 \times 10^{-3}$   | 156   | 324   |
| 1,3-DCB  | 1.2884 at 20 °C                      | $2.8 \times 10^{-3}$  | 125   | 295   |
| 1,4-DCB  | 1.46 at 20 °C                        | $2.41 \times 10^{-3}$   | 80  | 275   |

The density of the COI presented above are representative of the compounds when present as a pure phase and provide information that can be used to infer the vertical position of where the most significant impacts in a groundwater system might occur. Benzene for example, has a density that is less than that of water (i.e., 0.9996 grams per milliliter). Therefore, when released as a pure phase and in sufficient quantities, benzene will tend to accumulate along the top of the capillary fringe and phreatic surface and the core of the plume will typically not penetrate deeply into the aquifer except in areas of strongly downward vertical hydraulic gradients. Conversely, CB and DCB are denser than water and when released in sufficient quantities, may penetrate to depths below the phreatic surface. The plumes generated from compounds denser than water can exhibit high and sometimes uniform concentrations over a large thickness of the aquifer.

Volatilization can be an important transfer mechanism for compounds that exhibit a Henry's Law Constant higher than  $10^{-5}$  atm-m<sup>3</sup>/mol. Based upon these data, the COI are compounds that can readily partition from groundwater into soil vapor and volatilization could be an attenuation mechanism for the COI in groundwater at this Site.



Benzene is moderately soluble in water and CB and the DCB isomers are somewhat soluble in water. The solubilities of the COI are significant with respect to MNA in that more soluble compounds typically tend to be more readily biodegradable. In addition, a comparison of the concentration of a COI detected in groundwater to its water solubility can provide insight into parts of the plume where the reductions in concentration due to MNA may be more readily observed. For example, the concentration of benzene during the 2Q10 monitoring round at monitoring well BSA-MW-1 in the BSA source area was 840 mg/l; similarly, the concentration of CB was 16 mg/l at CPA-MW-1 near the chlorobenzene source area. Consequently, readily observable changes in concentrations of the COI due to MNA are more likely to occur in wells downgradient of the source areas and these particular wells.

The organic carbon partitioning coefficients of CB and the DCB isomers are greater than 200 liters per kilogram. Therefore, these COI are expected to adsorb appreciably to organic carbon in the soil, suspended solids, or sediments and sorption may be an important attenuation process for reducing concentrations of CB and DCB in groundwater. Consistent with its solubility, benzene has a lower organic carbon partitioning coefficient, more readily partitions into an aqueous phase, and may be more easily biodegradable as compared to CB or DCB.

## 4.0 BIODEGRADATION MECHANISMS

Biodegradation of benzene and chlorobenzenes (CB and DCB isomers) can occur under both aerobic and anaerobic conditions. In general, biodegradation of these COI are believed to proceed most rapidly under aerobic conditions where dissolved oxygen is present in groundwater at concentrations of several mg/l. Biodegradation of benzene, CB and the DCB isomers can also occur under anaerobic conditions via several different reaction pathways. Biodegradation under anaerobic conditions occurs when oxygen has been depleted, an alternative electron acceptor (e.g., nitrate, iron(III), sulfate, or carbon dioxide) is available, and microbes capable of using one of the alternative electron acceptors are present (ATSDR, 2007). Degradation reactions are listed below in order of increasingly anaerobic conditions. Geochemical data collected from Site monitoring wells (discussed later in this memorandum) when evaluated with respect to these stoichiometric equations can help to provide an understanding of the dominant mechanisms of biodegradation occurring within the plumes:

### 4.1.1 Benzene (C<sub>6</sub>H<sub>6</sub>) Reactions

- Benzene oxidation / aerobic respiration:  $7.5\text{O}_2 + \text{C}_6\text{H}_6 \Rightarrow 6\text{CO}_2 + 3\text{H}_2\text{O}$
- Benzene oxidation / denitrification:  $6\text{NO}_3^- + 6\text{H}^+ + \text{C}_6\text{H}_6 \Rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + 3\text{N}_2$
- Benzene oxidation / manganese reduction:  $30\text{H}^+ + 15\text{MnO}_2 + \text{C}_6\text{H}_6 \Rightarrow 6\text{CO}_2 + 15\text{Mn}^{2+} + 18\text{H}_2\text{O}$
- Benzene oxidation / nitrate reduction:  $3.75\text{NO}_3^- + \text{C}_6\text{H}_6 + 7.5\text{H}^+ + 0.75\text{H}_2\text{O} \Rightarrow 6\text{CO}_2 + 3.75\text{NH}_4^+$
- Benzene oxidation / iron reduction:  $60\text{H}^+ + 30\text{Fe}(\text{OH})_3 + \text{C}_6\text{H}_6 \Rightarrow 6\text{CO}_2 + 30\text{Fe}^{2+} + 78\text{H}_2\text{O}$
- Benzene oxidation / sulfate reduction:  $7.5\text{H}^+ + 3.75\text{SO}_4^{2-} + \text{C}_6\text{H}_6 \Rightarrow 6\text{CO}_2 + 3.75\text{H}_2\text{S}^0 + 3\text{H}_2\text{O}$
- Benzene oxidation / methanogenesis:  $4.5\text{H}_2\text{O} + \text{C}_6\text{H}_6 \Rightarrow 2.25\text{CO}_2 + 3.75\text{CH}_4$

## 4.1.2 Chlorobenzene (C<sub>6</sub>H<sub>5</sub>Cl) Reactions

- CB oxidation / aerobic respiration:  $7\text{O}_2 + \text{C}_6\text{H}_5\text{Cl} \Rightarrow 6\text{CO}_2 + 2\text{H}_2\text{O} + \text{H}^+ + \text{Cl}^-$
- CB oxidation / denitrification:  $5.6\text{NO}_3^- + 4.6\text{H}^+ + \text{C}_6\text{H}_5\text{Cl} \Rightarrow 6\text{CO}_2 + 4.8\text{H}_2\text{O} + 2.8\text{N}_2 + \text{Cl}^-$
- CB oxidation / manganese reduction:  $14\text{MnO}_2 + 27\text{H}^+ + \text{C}_6\text{H}_5\text{Cl} \Rightarrow 6\text{CO}_2 + 16\text{H}_2\text{O} + 14\text{Mn}^{2+} + \text{Cl}^-$
- CB oxidation / iron reduction:  $28\text{Fe}(\text{OH})_3 + 55\text{H}^+ + \text{C}_6\text{H}_5\text{Cl} \Rightarrow 6\text{CO}_2 + 72\text{H}_2\text{O} + 28\text{Fe}^{2+} + \text{Cl}^-$
- CB oxidation / sulfate reduction:  $3.5\text{SO}_4^{2-} + 6\text{H}^+ + \text{C}_6\text{H}_5\text{Cl} \Rightarrow 6\text{CO}_2 + 2\text{H}_2\text{O} + 3.5\text{H}_2\text{S}^0 + \text{Cl}^-$
- CB oxidation / methanogenesis:  $5\text{H}_2\text{O} + \text{C}_6\text{H}_5\text{Cl} \Rightarrow 2.5\text{CO}_2 + 3.5\text{CH}_4 + \text{H}^+ + \text{Cl}^-$

## 4.1.3 Dichlorobenzene (C<sub>6</sub>H<sub>4</sub>Cl<sub>2</sub>) Reactions

- DCB oxidation / aerobic respiration:  $6.5\text{O}_2 + \text{C}_6\text{H}_4\text{Cl}_2 \Rightarrow 6\text{CO}_2 + 2\text{H}^+ + \text{H}_2\text{O} + 2\text{Cl}^-$
- DCB oxidation / denitrification:  $5.2\text{NO}_3^- + 3.2\text{H}^+ + \text{C}_6\text{H}_4\text{Cl}_2 \Rightarrow 6\text{CO}_2 + 3.6\text{H}_2\text{O} + 2.6\text{N}_2 + 2\text{Cl}^-$
- DCB oxidation / manganese reduction:  
 $13\text{MnO}_2 + 24\text{H}^+ + \text{C}_6\text{H}_4\text{Cl}_2 \Rightarrow 6\text{CO}_2 + 14\text{H}_2\text{O} + 13\text{Mn}^{2+} + 2\text{Cl}^-$
- DCB oxidation / iron reduction:  $26\text{Fe}(\text{OH})_3 + 50\text{H}^+ + \text{C}_6\text{H}_4\text{Cl}_2 \Rightarrow 6\text{CO}_2 + 66\text{H}_2\text{O} + 26\text{Fe}^{2+} + 2\text{Cl}^-$
- DCB oxidation / sulfate reduction:  $3.25\text{SO}_4^{2-} + 4.5\text{H}^+ + \text{C}_6\text{H}_4\text{Cl}_2 \Rightarrow 6\text{CO}_2 + \text{H}_2\text{O} + 3.25\text{H}_2\text{S}^0 + 2\text{Cl}^-$
- DCB oxidation / methanogenesis:  $5.5\text{H}_2\text{O} + \text{C}_6\text{H}_4\text{Cl}_2 \Rightarrow 2.75\text{CO}_2 + 3.25\text{CH}_4 + 2\text{H}^+ + 2\text{Cl}^-$

## 5.0 ASSESSMENT OF NATURAL ATTENUATION

Consistent with the objectives of the work plan, demonstration of MNA involves the following three lines of evidence:

- **Primary evidence:** Primary lines of evidence of MNA include declining concentrations of COI that coincide with increases in certain biodegradation products (e.g., carbon dioxide and/or methane), concentration distributions that indicate stable or shrinking plumes, and compound-specific isotope analyses indicating reduction in the concentration of an isotopically marked electron donor and enrichment of the isotopic fraction of a specific isotope (e.g., carbon 13) in biomass.
- **Secondary evidence:** Secondary lines of evidence of MNA include depleted concentrations of electron acceptors (e.g., dissolved oxygen, nitrate, and sulfate) within the boundaries of the plume.

- **Tertiary evidence:** Tertiary lines of evidence include the presence of certain types of bacteria in the aquifer that are capable of degrading constituents of interest in moderate to robust populations.

Evaluation for each of these lines of evidence is discussed in the following sections.

## 5.1 TRENDS IN COI CONCENTRATIONS AND PLUME STABILITY

To assess the primary lines of evidence of MNA, URS reviewed existing analytical data for COI from the ten monitoring wells located along the axis of the BSA and CPA plumes. This review included: 1) plotting the change in concentration distribution of the plumes (in plan view) over time under similar water level and potentiometric conditions; and 2) assessing the suitability of performing a statistical analysis of the COI analytical data using the Mann-Kendall Statistic to evaluate trends in the COI concentrations over time under similar water level and potentiometric conditions. Concentrations of COI and selected electron acceptors, along with water levels observed in individual wells, were plotted chronologically by monitoring event to determine if there was a seasonal correlation between concentration and water levels.

Based upon a comparison of potentiometric surface contour maps developed for monitoring events performed since 2006, potentiometric contours are affected by seasonal water level changes. Based upon similar groundwater elevations and distribution of equipotential contours, the following data sets were judged to be representative of "typical" potentiometric surfaces:

- For monitoring wells BSA-MW-1S through BSA-MW-4D and CPA-MW-1D through CPA-MW-4D, data from 3Q and 4Q 2008; and 1Q and 3Q 2009; and 1Q 2010.
- For monitoring wells BSA-MW-5 and CPA-MW-5, data from 2Q and 3Q 2008; 3Q 2009; and 1Q 2010.

### 5.1.1 Concentration Plots

The concentrations of benzene and CB were mapped and concentration contours were developed to evaluate the changes in the distribution of COI over time.

Benzene concentrations for 2Q06 and 1Q10 are shown in **Figures 4 and 5**, respectively; CB concentrations for 2Q06 and 1Q10 are shown in **Figures 6 and 7**, respectively. The concentrations from these monitoring events were selected because they were the two monitoring events furthest apart in time that had "typical" potentiometric surfaces. There were no significant concentration changes observed in the BSA and CPA Plumes between the source areas and the river over this time period, which indicates that the plumes are not expanding.

These maps also indicate that the benzene and CB concentrations in groundwater near the Mississippi River are consistent with the flowpaths indicated by the cross-sections through the BSA and CPA Plumes (see **Figures 2 and 3**). In particular, higher concentrations of benzene in wells near the river appear to be associated with benzene detected in groundwater in the plume stability well (PSMW-01) located upgradient of the BSA and CPA area.

In addition, plots for each well were developed to evaluate changes in the COI concentrations and potential oxidation and transformation products generated from the biodegradation of these COI (e.g., ferrous iron [ $\text{Fe}^{2+}$ ] and carbon dioxide and methane, respectively) over time. The level of the groundwater table in each monitoring well is also shown on these plots. These plots were reviewed to assess if the COI were attenuating, in which case one would expect to see concentrations of COI decrease, and concentrations of potential transformation products from biodegradation increase, over time. Plots of the data for each quarterly monitoring round from 3Q08 through 2Q10, together with the supporting information, are presented in **Attachment A**. Review of the data indicates that there is generally no change in the COI concentrations over time, but does indicate that the concentrations are seasonally affected, as discussed below.

### 5.1.2 Mann-Kendall Analysis

The work plan states that the non-parametric Mann-Kendall Test, combined with the coefficient of variation (CV) test, will be used to evaluate the significance of trends of COI in groundwater at the Site. The Mann-Kendall Test is considered to be appropriate for evaluating trends in the data for the following reasons:

- This test is designed to handle data that are non-parametric (i.e., do not exhibit a specific distribution such as normal or log normal);
- Data set can contain data collected at irregularly spaced intervals in time; and
- Data set can contain elevated (outlier) values compared to the average or non-detect results.

The Mann-Kendall Test was performed using the spreadsheet provided by the State of Wisconsin Department of Natural Resources Remediation and Redevelopment Program (WIDNR Form 4400-215, dated February 2001). The WIDNR spreadsheet evaluates trends in data over time at the 80% and 90% confidence levels. If no trend exists at the 80% confidence level, the spreadsheet will evaluate the stability of the data. The WIDNR spreadsheet was revised by URS to also evaluate trends at the 95 % confidence level.

Performing the Mann-Kendall Test with the WIDNR spreadsheet will provide one of several different trend and stability results for a given data set. These results, as well as what they mean, are as follows:

#### 1. Trend Results:

- Increasing – a sufficient number of data points are greater than the previous data points, so the Mann-Kendall Statistic (S) is greater than the absolute value of the critical Mann-Kendall Statistic ( $S_{cr}$ ) for the given confidence level.
- Decreasing – a sufficient number of data points are less than the previous data points, so the Mann-Kendall Statistic (S) is less than the critical Mann-Kendall Statistic ( $S_{cr}$ ) for the given confidence level.
- No Trend – does not meet the criteria for increasing or decreasing trends.

- $n < 4$  – an insufficient number of data points that are considered to be valid to perform the Mann-Kendall Test (i.e., less than 4 valid data points), so data could not be analyzed.

## 2. Stability Results:

- Stable – A trend could not be determined at the 80% confidence level and the covariance is less than 1.0.
- Non-Stable – A trend could not be determined at the 80% confidence level and the covariance is greater than or equal to 1.0.
- NA – Not Analyzed; stability could not be determined at the 80% confidence level because the Mann-Kendall Statistic (S) was greater than the number of events in the analysis.
- $n < 4$  – an insufficient number of data points that are considered to be valid to perform the Mann-Kendall Test (i.e., less than 4 valid data points), so data could not be analyzed.

The Mann-Kendall Test is not valid for unadjusted data that exhibits seasonal behavior (i.e., data that is not seasonally consistent). Seasonal behavior of the MNA data (i.e., from 3Q08 through 2Q10) from wells in the BSA and CPA Plumes were evaluated in two ways. First, as noted above, the potentiometric contours of the DHU are affected by seasonal water level changes, which are expected to result in seasonal variations in the COI concentrations. Second, COI concentrations and groundwater levels measured during each sampling event were plotted versus time. For the BSA and CPA Plume monitoring wells, concentrations of COI and groundwater elevations exhibited generally parallel trends, as shown in the plots in **Attachment A**, which is consistent with the concentrations being seasonally affected. From the review of these plots and the potentiometric contours, the data obtained during 3Q08, 4Q08, 1Q09, 3Q09, and 1Q10 appeared to be seasonally consistent at monitoring wells BSA-MW-1S through BSA-MW-4D and CPA-MW-1D through CPA-MW-4D. For monitoring wells BSA-MW-5D and CPA-MW-5D, the data from 3Q08, 4Q08, 3Q09, and 1Q10 are considered to be seasonally consistent. The 2Q09, 4Q09 and 2Q10 data (as well as the 1Q09 data for monitoring wells BSA-MW-5D and CPA-MW-5D) was obtained during very high river stages and do not appear to be seasonally consistent with the other data obtained during the two years of monitoring. Therefore, seasonally valid data were considered to be provided by four or five monitoring events, which were then used for the Mann-Kendall Test analysis.

The results of the trend analyses for the COI in each monitoring well are summarized below in **Table 3** and supporting information is presented in **Attachment B**.

**Table 3: Summary of Results of Mann-Kendall Trend Test and Stability Analysis**

| Monitoring Well | Benzene                           |            | Monochlorobenzene                 |           | Total Dichlorobenzene             |           |
|-----------------|-----------------------------------|------------|-----------------------------------|-----------|-----------------------------------|-----------|
|                 | Trend $\geq$ 90% Confidence Level | Stability  | Trend $\geq$ 90% Confidence Level | Stability | Trend $\geq$ 90% Confidence Level | Stability |
| BSA-MW-1S       | No Trend                          | NA         | n<4                               | n<4       | n<4                               | n<4       |
| BSA-MW-2D       | No Trend                          | NON-STABLE | No Trend                          | NA        | n<4                               | n<4       |
| BSA-MW-3D       | No Trend                          | STABLE     | DECREASING                        | NA        | DECREASING                        | NA        |
| BSA-MW-4D       | No Trend                          | NON-STABLE | No Trend                          | STABLE    | No Trend                          | STABLE    |
| BSA-MW-5D       | No Trend                          | NA         | INCREASING                        | NA        | No Trend                          | NA        |
|                 |                                   |            |                                   |           |                                   |           |
| CPA-MW-1D       | INCREASING                        | NA         | INCREASING                        | NA        | No Trend                          | STABLE    |
| CPA-MW-2D       | No Trend                          | NA         | DECREASING                        | NA        | No Trend                          | NA        |
| CPA-MW-3D       | No Trend                          | NA         | INCREASING                        | NA        | No Trend                          | NA        |
| CPA-MW-4D       | No Trend                          | NON-STABLE | No Trend                          | STABLE    | No Trend                          | NA        |
| CPA-MW-5D       | n<4                               | n<4        | INCREASING                        | NA        | INCREASING                        | NA        |
| Monitoring Well | 1,2-Dichlorobenzene               |            | 1,3-Dichlorobenzene               |           | 1,4-Dichlorobenzene               |           |
|                 | Trend $\geq$ 90% Confidence Level | Stability  | Trend $\geq$ 90% Confidence Level | Stability | Trend $\geq$ 90% Confidence Level | Stability |
| BSA-MW-1S       | n<4                               | n<4        | n<4                               | n<4       | n<4                               | n<4       |
| BSA-MW-2D       | n<4                               | n<4        | n<4                               | n<4       | n<4                               | n<4       |
| BSA-MW-3D       | INCREASING                        | NA         | DECREASING                        | NA        | INCREASING                        | NA        |
| BSA-MW-4D       | No Trend                          | STABLE     | n<4                               | n<4       | No Trend                          | STABLE    |
| BSA-MW-5D       | No Trend                          | NA         | n<4                               | n<4       | No Trend                          | NA        |
|                 |                                   |            |                                   |           |                                   |           |
| CPA-MW-1D       | No Trend                          | STABLE     | No Trend                          | STABLE    | No Trend                          | STABLE    |
| CPA-MW-2D       | No Trend                          | STABLE     | No Trend                          | STABLE    | No Trend                          | NA        |
| CPA-MW-3D       | No Trend                          | STABLE     | No Trend                          | STABLE    | INCREASING                        | NA        |
| CPA-MW-4D       | No Trend                          | STABLE     | n<4                               | n<4       | No Trend                          | NA        |
| CPA-MW-5D       | No Trend                          | NA         | n<4                               | n<4       | INCREASING                        | NA        |

Note: n<4 - insufficient valid data for analysis because all (or all but one) of the analytical results used in the analysis were below detection limits (i.e., non-detect).

The Mann-Kendall Test indicated the following:

- Benzene concentrations generally exhibited no trend at the 90% confidence level and stability was generally non-stable or not analyzed (NA).
- In the nine monitoring wells where CB was detected, concentrations were increasing at four locations; decreasing at two locations; and exhibited no trend at the 90% confidence level at three locations. The concentrations were stable at two locations where no trend was exhibited, and not analyzed (NA) at the other locations where CB was detected.

- In the eight monitoring wells where DCB was detected, total DCB concentrations were increasing at one location; decreasing at one location; and exhibited no trend at the 90% confidence level at the other locations. The concentrations were stable at two locations and not analyzed (NA) at the other locations.
- In the eight monitoring wells where 1,2-DCB was detected, concentrations were increasing at one location and exhibited no trend at the 90% confidence level at the other locations. The concentrations were stable at five locations and not analyzed (NA) at the other three locations with detectable concentrations of 1,2-DCB.
- Six of the ten monitoring wells did not have 1,3-DCB concentrations in all, or all but one, of the sampling events evaluated. In the four monitoring wells where 1,3-DCB was detected, concentrations were decreasing at one location and exhibited no trend at the 90% confidence level at the other three locations. The concentrations were stable at the three locations where 1,3-DCB concentrations exhibited no trend at the 90% confidence level.
- In the eight monitoring wells where 1,4-DCB was detected, concentrations were increasing at three locations and exhibited no trend at the 90% confidence level at the other locations. The concentrations were stable at two locations and not analyzed (NA) at the other three locations with detectable concentrations of 1,4-DCB.

### 5.1.3 Compound-Specific Isotope Analyses

As noted above, a primary line of evidence of MNA includes CSIA which can indicate a reduction in the concentration of an isotopically marked electron donor and enrichment of the isotopic fraction of a specific isotope in biomass. In accordance with the LTMP Work Plan, Bio-trap<sup>®</sup> samplers from Microbial Insights were installed in BSA-MW-2D and in CPA-MW-3D. These samplers were baited with a specially synthesized form of the COI (i.e., benzene and CB) containing carbon 13 isotopes (<sup>13</sup>C). Since the <sup>13</sup>C isotopes are rare, the labeled compound can be readily differentiated from the COI present at the Site. As Microbial Insights notes: "following deployment, the Bio-trap<sup>®</sup> is recovered and three approaches are used to conclusively demonstrate biodegradation of the contaminant of concern:

- The loss of the labeled compound provides an estimate of the degradation rate (% loss of <sup>13</sup>C).
- Quantification of <sup>13</sup>C-enriched phospholipid fatty acids (PLFA) indicates incorporation into microbial biomass.
- Quantification of <sup>13</sup>C-enriched dissolved inorganic carbon (DIC) indicates contaminant mineralization."

Bio-trap<sup>®</sup> samplers baited with <sup>13</sup>C-labeled benzene (BSA-MW-2D) or <sup>13</sup>C chlorobenzene (CPA-MW-3D) were deployed in monitoring wells during each quarterly monitoring event for approximately 30 days and then recovered for analysis. Microbial Insights summarized the results of these analyses as follows:

- Moderate levels (approximately  $1 \times 10^5$  cells/bead) of total biomass were detected in both the benzene (BSA-MW-2D) and CB (CPA-MW-3) baited Bio-trap<sup>®</sup> samplers. These populations are

considered to be indicative of moderate biomass and represent viable populations of microorganisms for biodegradation.

- Quantification of the  $^{13}\text{C}$ -enriched biomass demonstrated a high level of utilization of benzene by the indigenous microbes in well BSA-MW-2D which conclusively indicates the occurrence of biodegradation of benzene by indigenous microorganisms. The biomass only incorporated  $^{13}\text{C}$  in the CB baited Bio-trap<sup>®</sup> samplers in well CPA-MW-3D during 1Q09 and 1Q10; during the other quarters  $^{13}\text{C}$  was not incorporated into the biomass in the CB baited Bio-trap<sup>®</sup> samplers.
- Quantification of  $^{13}\text{C}$  dissolved inorganic carbon (DIC) demonstrated high levels of benzene mineralization in well BSA-MW-2D. Mineralization of CB was identified in CPA-MW-3D. Although  $^{13}\text{C}$  was not detected in biomass in the Biotrap that was baited with CB during five of the eight monitoring events, the mineralization of CB indicates that the CB is being biodegraded and respired by microorganisms as carbon dioxide. This is consistent with the concentrations of carbon dioxide detected in wells in downgradient parts of the plumes as discussed later in this memorandum.
- Comparison of pre- and post-deployment  $^{13}\text{C}$  labeled benzene in well BSA-MW-2D showed minimal loss of the  $^{13}\text{C}$  labeled benzene. Losses of the  $^{13}\text{C}$  labeled CB ranged from 34 to 63 percent in CPA-MW-3D.

From these findings, it can be concluded that benzene and CB are being degraded by microorganisms that are present in the BSA and CPA Plumes.

## 5.2 TRENDS IN TRANSFORMATION PRODUCTS AND ELECTRON ACCEPTORS

To evaluate the secondary lines of evidence of MNA, plots of concentration versus distance were developed for the COI (e.g., benzene, CB, and total DCB isomers), specific electron acceptor (e.g., sulfate), and potential oxidation and transformation products generated from the biodegradation of these COI (e.g., ferrous iron [ $\text{Fe}^{2+}$ ] and carbon dioxide and methane, respectively). These plots were reviewed to assess if the COI were attenuating, in which case one would expect to see concentrations of COI and electron acceptors decrease and concentrations of potential transformation products from biodegradation to increase with distance along a flow path within the plume. Plots for each quarterly monitoring round from 3Q08 through 2Q10 are presented in **Figures 8 and 9** and are discussed below.

### 5.2.1 Change in Concentration of COI with Distance

For the BSA and CPA Plumes, plots were developed to show changes in concentration of COI, electron acceptors, and transformation products versus distance for monitoring wells that were considered to be along the flowpaths that originated at the BSA and CPA source areas, respectively. From cross-sections showing the vertical equipotential isopleths along the CPA Plume (**Figure 2**), the monitoring wells in the CPA Plume located along a flowpath were CPA-MW-1D through CPA-MW-4D. From cross-sections showing the vertical equipotential isopleths along the BSA Plume (**Figure 3**), the monitoring wells in the BSA Plume located along a flowpath were BSA-MW-1S and BSA-MW-2D.

In addition, the Excel "Trend Line" function was used to determine the exponential decay function (i.e.,  $y = be^{-mx}$ ) for the COI data on the plots for 3Q and 4Q 2008; 1Q, 2Q, 3Q and 4Q 2009; and 1Q and 2Q 2010. The  $m$  value in the exponential decay function is the COI concentration reduction rate in units of



length<sup>-1</sup>. The reduction rate (i.e. bulk attenuation rate) incorporates all mechanisms that reduce the COI (e.g., advection, sorption, degradation); the degradation rate (k, in units of time<sup>-1</sup>) is the reduction rate divided by the COI velocity (v<sub>c</sub>) through the soil. The typical soil data presented in **Table 1** were used to determine the transport velocity of the COI through the soil (v<sub>c</sub> in length per time), and then to calculate the degradation rate. The average reduction rates, COI velocities, and degradation rates for each COI are summarized below in **Table 4**, and supporting information is presented in **Attachment C**.

The estimated degradation rates for benzene in the BSA and CPA Plumes are within the range of typical values for anaerobic degradation of benzene presented by Newell et al (2002). However, the estimated degradation rates for CB and the DCB isomers in the CPA Plume appear to be lower than indicated in the literature (WHO, 2004).

| <b>Constituent of Interest</b> | <b>Reduction Rate (centimeter<sup>-1</sup>)</b> | <b>COI Velocity (centimeter/second)</b> | <b>Degradation Rate (days<sup>-1</sup>)</b> |
|--------------------------------|---|---|---|
| <b>BSA Plume</b>               |   |   |   |
| Benzene                        | 0.00009   | 0.00006                                 | 0.00052                                     |
| <b>CPA Plume</b>               |   |   |   |
| Benzene                        | 0.00004   | 0.00006                                 | 0.00023                                     |
| CB                             | 0.00004   | 0.00003                                 | 0.00008                                     |
| 1,2-DCB                        | 0.00007   | 0.00002                                 | 0.00012                                     |
| 1,3-DCB                        | 0.00006   | 0.00002                                 | 0.00011                                     |
| 1,4-DCB                        | 0.00008   | 0.00002                                 | 0.00014                                     |

## 5.2.2 Change in Concentration of Electron Acceptors and By-Products with Distance

Plots showing the changes in concentrations of sulfate, ferrous iron, carbon dioxide and methane with distance were also developed for monitoring wells that were considered to be along the BSA and CPA Plume flowpaths using the same monitoring wells as above. These plots were developed to provide data that may indicate specific electron acceptors being utilized to degrade the COI and to identify the geochemical reaction(s) that define the degradation pathway(s). These plots are included in **Figures 8 and 9**, and supporting information is presented in **Attachment C**.

Changes in concentrations of sulfate, ferrous iron, carbon dioxide and methane with distance that appeared to be occurring at the Site and downgradient of the Site are summarized in **Table 5** and briefly discussed below.

| <b>Table 5</b><br><b>Change in Concentration of Electron Acceptors and By-Products with Distance</b> |   |                         |  |
|--|---|-------------------------|--|
| <b>Electron Acceptors or By-Products</b>   | <b>Change with Distance</b>                       | <b>Change with Time</b> | <b>Supports Finding of Natural Attenuation</b>       |
| <b>BSA Plume</b>   |   |                         |  |
| Sulfate ( $\text{SO}_4^{2-}$ )   | No change   | Decrease                | Yes  |
| Ferric Iron ( $\text{Fe}^{3+}$ )   | No change   | Decrease                | Inconclusive   |
| Ferrous Iron ( $\text{Fe}^{2+}$ )  | No change   | No change               | Inconclusive   |
| Carbon Dioxide ( $\text{CO}_2$ )   | Elevated, slight increase                         | Increase                | Yes  |
| Methane ( $\text{CH}_4$ )  | Elevated, typically no change with distance       | Increase in 2009        | Yes  |
| Oxidation-Reduction Potential (ORP)  | No change or slight decrease                      | Decrease                | In range for sulfate reduction and/or methanogenesis |
| <b>CPA Plume</b>   |   |                         |  |
| Sulfate ( $\text{SO}_4^{2-}$ )   | Slight decrease, occasional increase nearer river | Decrease                | Yes  |
| Ferric Iron ( $\text{Fe}^{3+}$ )   | Variable, but at low concentrations               | Increase                | Inconclusive   |
| Ferrous Iron ( $\text{Fe}^{2+}$ )  | Increase  | No change               | Yes  |
| Carbon Dioxide ( $\text{CO}_2$ )   | Increase  | No change               | Yes  |
| Methane ( $\text{CH}_4$ )  | Elevated, increase with distance                  | No change               | Yes  |
| Oxidation-Reduction Potential (ORP)  | Decrease  | Decrease                | In range for sulfate reduction and/or methanogenesis |

## BSA Plume

1. Carbon dioxide is present at concentrations generally on the order of 25 to 60 mg/l and the  $\text{CO}_2$  concentrations generally increase over time. These trends provide secondary evidence of biodegradation of COI in the BSA plume.
2. Methane concentrations appear to be elevated and increasing over time indicating that electron acceptors (i.e., dissolved oxygen, nitrate, manganese, ferric iron, and sulfate) are being utilized. Specifically, the presence of methane indicates that reactions responsible for biodegradation are sulfate reduction/methanogenesis.
3. Methane concentrations appear to be elevated and increasing with distance, indicating that electron acceptors (i.e., nitrate, manganese, ferric iron [ $\text{Fe}^{3+}$ ], and sulfate) are being utilized.
4. The ORP is generally negative, which indicates anaerobic conditions exist within groundwater, consistent with the presence of elevated concentrations of organic compounds that exert a high

chemical oxygen demand. The ORP is generally in the range where the dominant reactions are sulfate reduction and methanogenesis.

### **CPA Plume**

1. Carbon dioxide concentrations appear to generally increase with distance from the source. As indicated in **Section 4.0**, carbon dioxide is produced during the utilization of electron acceptors (i.e., dissolved oxygen, nitrate, manganese, ferric iron, and sulfate). These trends provide secondary evidence of biodegradation of COI in the CPA plume.
2. Methane concentrations appear to be elevated and increasing with distance indicating that electron acceptors (i.e., dissolved oxygen, nitrate, manganese, ferric iron, and sulfate) are being utilized. Specifically, the presence of methane indicates that reactions responsible for biodegradation are sulfate reduction/methanogenesis.
3. The ORP is generally negative, which indicates anaerobic conditions exist within groundwater, consistent with the presence of elevated concentrations of organic compounds that exert a high chemical oxygen demand. The ORP is generally in the range where the dominant reactions are sulfate reduction and methanogenesis.

### **5.3 PRESENCE OF SPECIFIC TYPES OF BACTERIA**

Tertiary lines of evidence include the presence of certain types of bacteria in the aquifer that are capable of degrading constituents of interest in moderate to robust populations. Microbial Insights used an analysis of the phospholipid fatty acids (PLFA) to estimate the amount of bacteria present in the groundwater in the BSA and CPA Plumes, because "PLFA are a primary component of the membrane of all living cells including bacteria. PLFA decomposes rapidly upon cell death, so the total amount of PLFA present in a sample is indicative of the viable biomass" (Microbial Insights, 2010).

Additionally, analysis of the PLFA allows identifying the relative percentage of different bacteria present. As they noted "some organisms produce 'signature' types of PLFA allowing quantification of important microbial functional groups (e.g. iron reducers, sulfate reducers, or fermenters). The relative proportions of the groups of PLFA provide a 'fingerprint' of the microbial community. In addition, Proteobacteria modify specific PLFA during periods of slow growth or in response to environmental stress providing an index of their health and metabolic activity" (Microbial Insights, 2010).

In 3Q and 4Q 2008; 1Q, 2Q, 3Q and 4Q 2009; and 1Q and 2Q 2010, the results of the biological analysis indicated that a moderate biomass (i.e.,  $1 \times 10^5$  to  $1 \times 10^6$  cells) was present in the BSA and CPA Plumes. The dominant bacteria in the BSA and CPA Plumes were Proteobacteria (Monos), which were typically one half to three-quarters or more of the bacteria present. The next most prevalent bacteria were General (Nsats), which were typically 20% to 25% of the bacteria present. The Branched Monoenoic (BrMonos) and Mid-Chain Branched Saturated (MidBrSats) accounted for approximately 0 to 5% of the total biomass.

The following descriptions of these types of bacteria from the Microbial Insights 2010 data report are summarized in **Table 6**.

**Table 6: Descriptions of Bacteria Identified at the Site**

| PLFA Structural Group                    | General classification  | Potential Relevance to MNA  |
|--|---|---|
| Monoenoic (Monos)                        | Abundant in Proteobacteria (Gram negative bacteria), typically fast growing, utilize many carbon sources, and adapt quickly to a variety of environments. | Proteobacteria is one of the largest groups of bacteria and represents a wide variety of both aerobes and anaerobes. The majority of hydrocarbon (e.g., benzene) utilizing bacteria fall within the Proteobacteria. |
| Branched Monoenoic (BrMonos)             | Found in the cell membranes of micro-aerophiles and anaerobes, such as sulfate- or iron-reducing bacteria.  | High proportions are often associated with anaerobic sulfate and iron reducing bacteria.  |
| Mid-Chain Branched Saturated (MidBrSats) | Common in sulfate reducing bacteria and also Actinobacteria (High G+C Gram-positive bacteria).  | High proportions are often associated with anaerobic sulfate and iron reducing bacteria.  |
| Normal Saturated (Nsats)                 | Found in all organisms.   | High proportions often indicate less diverse populations.   |

Given the prevalence of the Monos-type bacteria, it appears that there are bacteria present that can degrade the benzene and chlorobenzene under the anaerobic conditions found in the BSA and CPA Plumes. There may also be some anaerobic sulfate and iron reducing bacteria present (i.e., the BrMonos and MidBrSats).

## 6.0 CONCLUSIONS

Our evaluation of the data from the groundwater monitoring conducted from 3Q08 through 2Q10 indicates the following:

1. The concentrations of benzene in the BSA plume and benzene, CB, and DCB isomers in the CPA plume generally decrease with distance from the sources.
2. The data exhibit seasonal behavior, so the Mann-Kendall Test was performed using data determined to be seasonally consistent to determine statistical trends in the concentrations of the COI over time in the monitoring wells in the BSA or CPA Plumes. The valid monitoring events were 3Q and 4Q 2008; and 1Q and 3Q 2009; and 1Q 2010; the data from 2Q09, 4Q09 and 2Q10 were obtained during non-typical (i.e., seasonally inconsistent) groundwater conditions. In addition, data from 1Q09 was considered to be seasonally inconsistent in the analyses of data for monitoring wells BSA-MW-5 and CPA-MW-5.
3. Based upon CSIA performed using Bio-trap<sup>®</sup> samplers baited with <sup>13</sup>C-labeled benzene and CB, microorganisms are present in groundwater and saturated soils that are actively biodegrading these compounds.
4. In the BSA Plume, the degradation rate for benzene is 0.00052/day. In the CPA Plume, the degradation rate for benzene is 0.00023/day; the degradation rate for CB is 0.00008/day. Degradation rates for DCB isomers in the CPA Plume were in the range of 0.00011 to 0.00014.

The degradation rates for benzene are within the typical published ranges; the degradation rate for CB appears to be at the low end of the expected range.

5. The BSA and CPA Plumes appear to have sulfate reducing/methanogenic conditions. Specifically, sulfate concentrations appear to generally remain stable or decrease with distance and decrease over time in both plumes. Carbon dioxide and methane concentrations appear to be elevated and generally remain stable or increase with distance from the source and/or during the monitoring period.

## 7.0 RECOMMENDATIONS

Supported by data collected during this evaluation, listed below are recommendations for changes to the Long-Term Groundwater Monitoring Program:

1. Reduce sampling frequency to semi-annual, with sampling events occurring during the first and third quarters of each year, as groundwater levels during those quarters tend to be seasonally consistent. This recommendation is consistent with US EPA's January 2007 "Technology Selection Report – Solutia Inc. W. G. Krummrich Facility, Sauget, Illinois."
2. Eliminate SVOC analytes (specifically 4-chloroaniline, 2-chlorophenol, 1,4-dioxane, and 1,2,4-trichlorobenzene) from laboratory analysis in samples collected from the five Benzene Storage Area (BSA) monitoring wells. The SVOC compounds have been detected infrequently and, when detected, the concentrations were near the detection limits.
3. Discontinue phospholipid fatty acids (PLFA) analyses and compound-specific isotope analyses (stable isotope probing [SIP]) because eight quarters of such testing have shown relatively consistent results that are sufficient to provide direct evidence of the occurrence of biodegradation processes.

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## **ATTACHMENTS**

### **FIGURES**

Figure 1: Site Map

Figure 2: Cross-section A-A' Through CPA Plume

Figure 3: Cross-section B-B' Through BSA Plume

Figure 4: Benzene Concentration Map – 2<sup>nd</sup> Quarter 2006

Figure 5: Benzene Concentration Map– 1<sup>st</sup> Quarter 2010

Figure 6: Chlorobenzene Concentration Map – 2<sup>nd</sup> Quarter 2006

Figure 7: Chlorobenzene Concentration Map – 1<sup>st</sup> Quarter 2010

Figure 8: Benzene Storage Area (BSA) Plume – Trends with Distance

Figure 9: Chlorobenzene Process Area (CPA) Plume – Trends with Distance

### **ATTACHMENT A**

Supporting Data for MNA Evaluation 3Q08 through 2Q10

### **ATTACHMENT B**

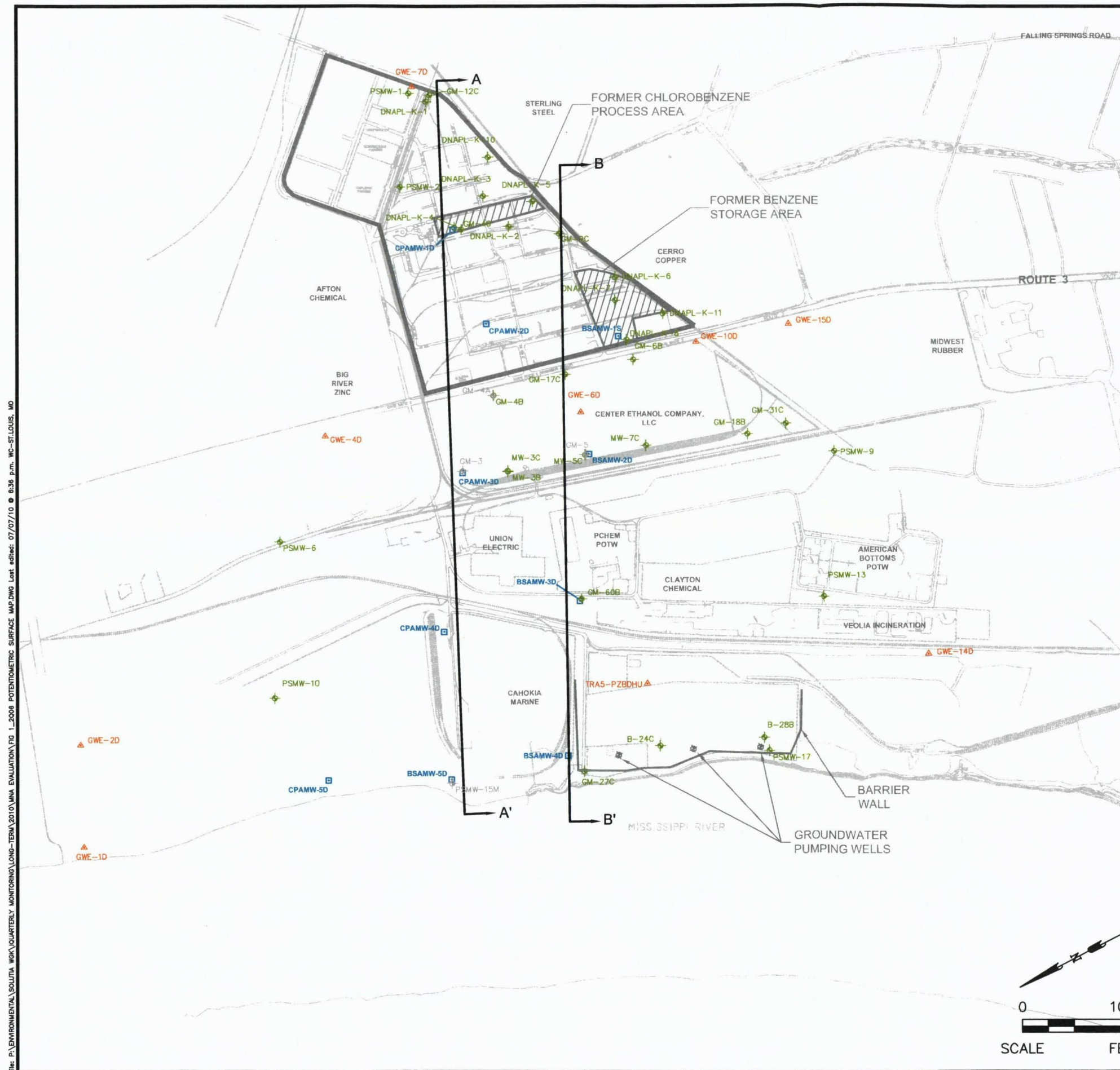
Mann-Kendall Analysis of MNA Data 3Q08 through 2Q10

### **ATTACHMENT C**




Evaluation of MNA Degradation 3Q08 through 2Q10



## Figures

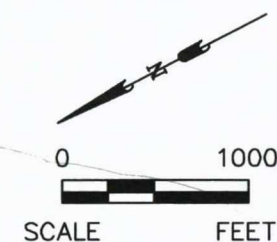



LEGEND

-  LONG-TERM MONITORING WELL
-  OTHER MONITORING WELL
-  PIEZOMETER CLUSTER

NOTES:

SEE FIGURE 2 FOR CROSS-SECTION A-A' FOR CHLOROBENZENE PROCESS AREA AND FIGURE 3 FOR CROSS-SECTION B-B' FOR BENZENE STORAGE AREA.



|  |          |                             |
|--|----------|-----------------------------|
| 2010 MNA EVALUATION<br>W.G. KRUMMRICH FACILITY<br>SAUGET, ILLINOIS   |          | PROJECT NO.<br><br>21562401 |
| <b>URS</b>   |          |                             |
| DRN. BY: dab July 2010<br>DSGN. BY: ekf<br>CHKD. BY:  | Site Map | FIG. NO.<br><br>1           |



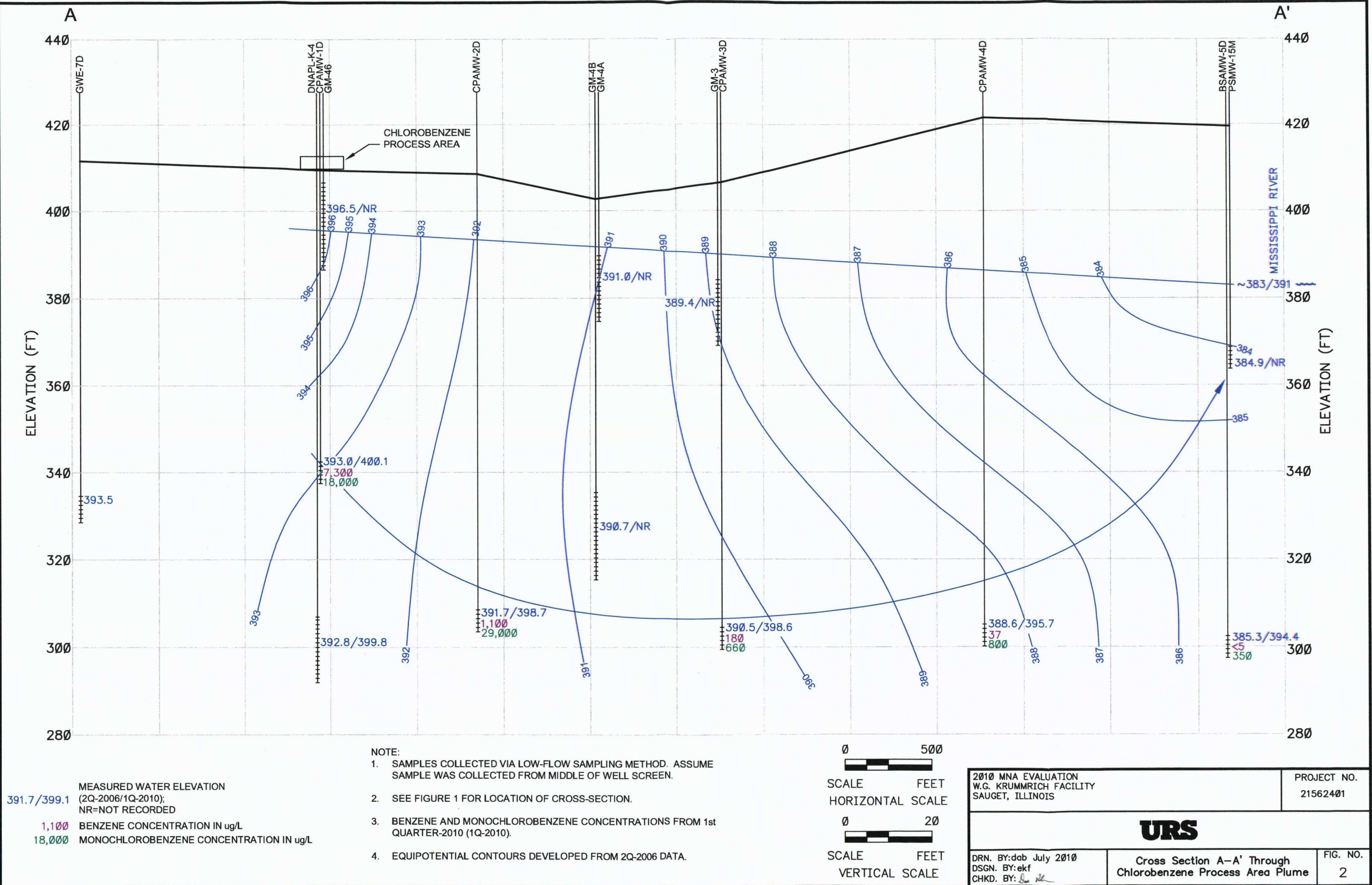
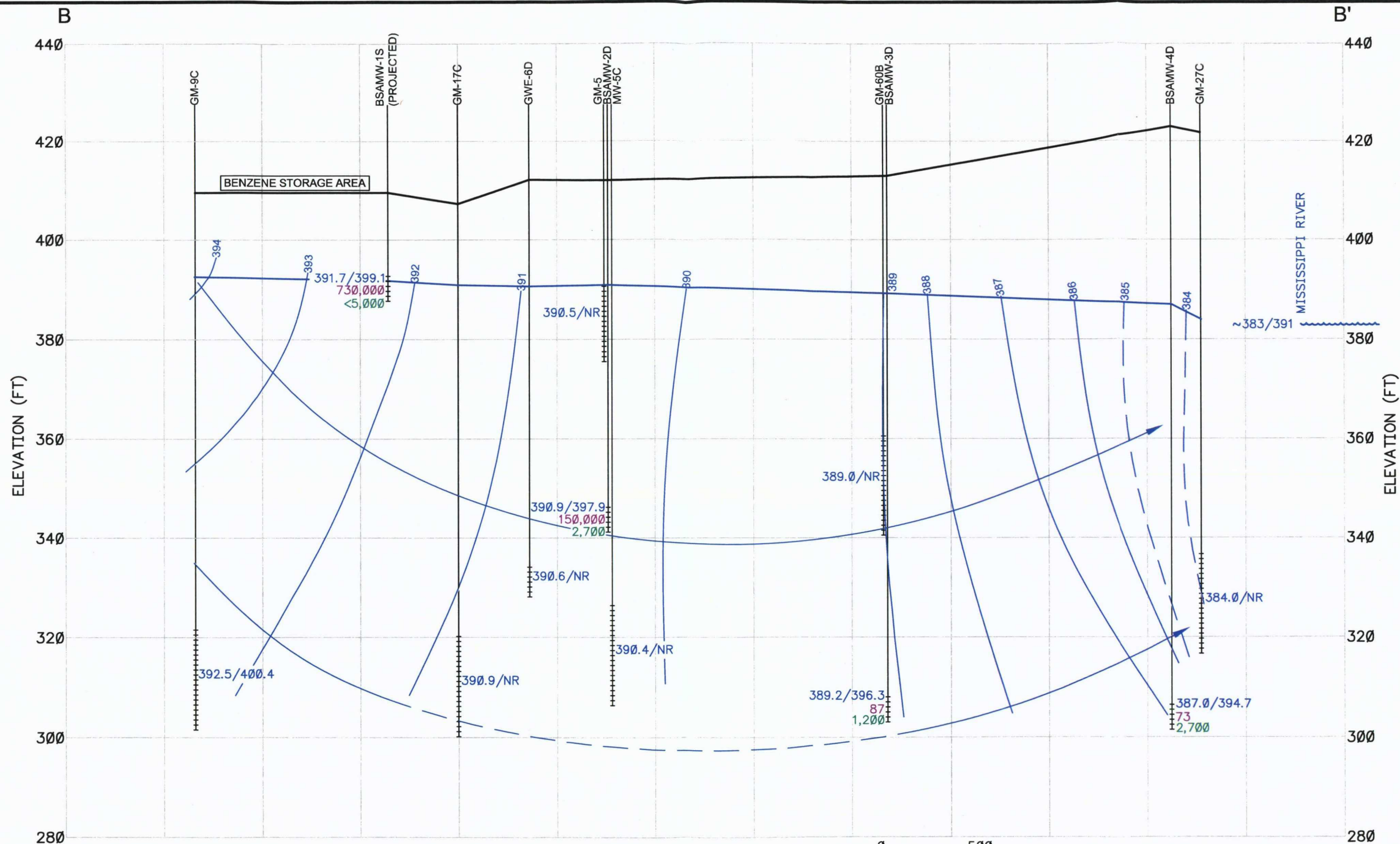




Fig. B-1 ENVIRONMENTAL SOLUTIONS WORK (QUARTERLY MONITORING) LONG-TERM MNA EVALUATION FIG. 3-2006 BENZENE & CHLOROBENZENE CROSS SECTION B-B' THROUGH BENZENE STORAGE AREA PLUME



391.7/399.1 MEASURED WATER ELEVATION  
(2Q-2006/1Q-2010);  
NR=NOT RECORDED  
2,200 BENZENE CONCENTRATION IN ug/L  
2,700 MONOCHLOROBENZENE CONCENTRATION IN ug/L

- NOTE:
1. SAMPLES COLLECTED VIA LOW-FLOW SAMPLING METHOD. ASSUME SAMPLE WAS COLLECTED FROM MIDDLE OF WELL SCREEN.
  2. SEE FIGURE 1 FOR LOCATION OF CROSS-SECTION.
  3. BENZENE AND MONOCHLOROBENZENE CONCENTRATIONS FROM 1st QUARTER-2010 (1Q-2010).
  4. EQUIPOTENTIAL CONTOURS DEVELOPED FROM 2Q-2006 DATA.

0 500  
SCALE FEET  
HORIZONTAL SCALE  
0 20  
SCALE FEET  
VERTICAL SCALE

2010 MNA EVALUATION  
W.G. KRUMMICH FACILITY  
SAUGET, ILLINOIS

PROJECT NO.  
21562401

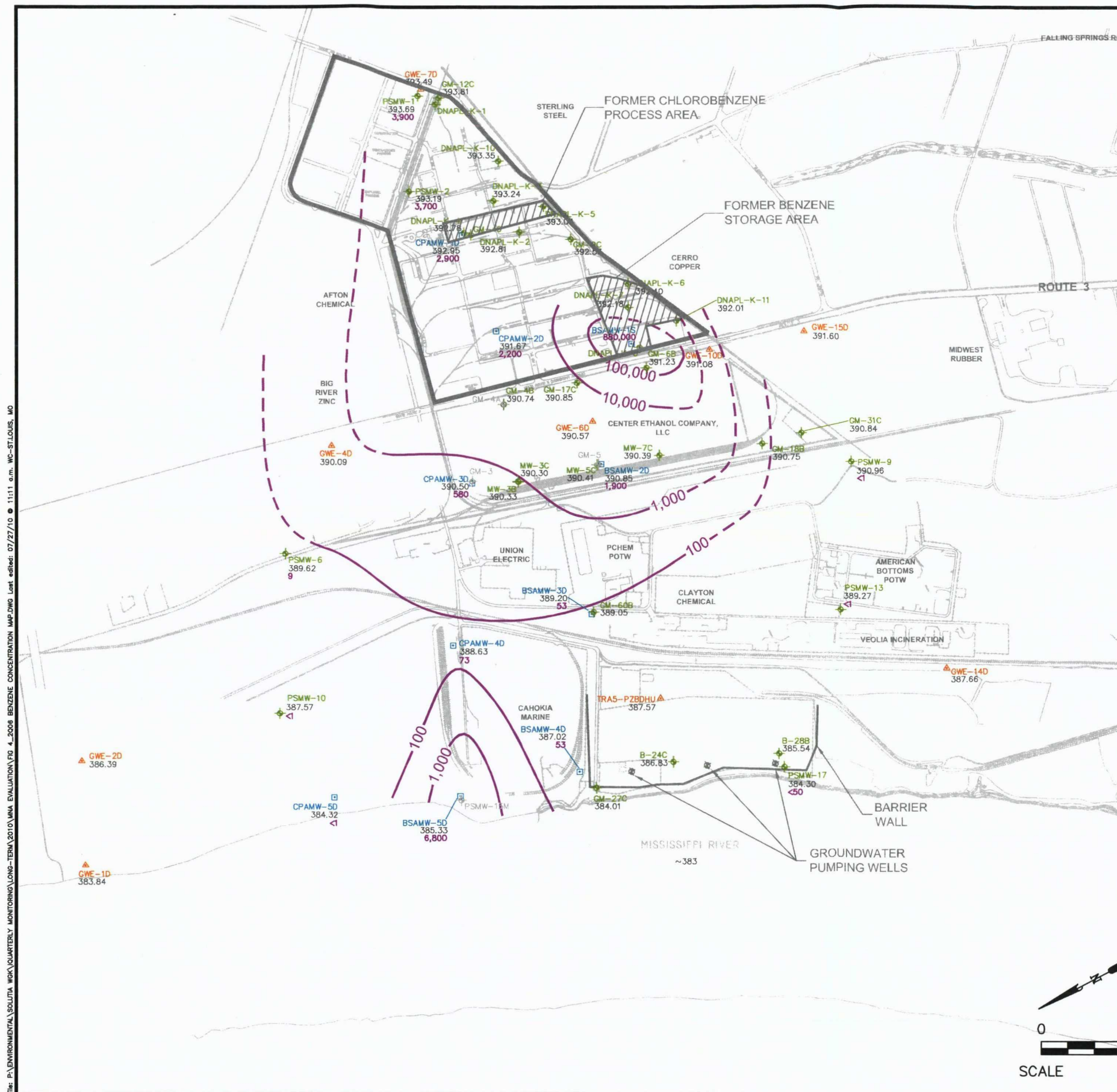
**URS**

DRN. BY:dab July 2010  
DSGN. BY:ekf  
CHKD. BY: [Signature]

Cross Section B-B' Through Benzene  
Storage Area Plume

FIG. NO.  
3



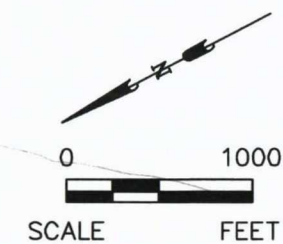


LEGEND

- LONG-TERM MONITORING WELL USED FOR GROUNDWATER CONTOURING
  - ✚ OTHER MONITORING WELL USED FOR GROUNDWATER CONTOURING
  - ▲ PIEZOMETER CLUSTER USED FOR GROUNDWATER CONTOURING
- 100**— MONOCHLOROBENZENE CONCENTRATION CONTOUR (ug/L)

NOTES:

CONTOURS GENERATED BASED ON PROFESSIONAL JUDGEMENT.



|   |   |                             |
|---|---|-----------------------------|
| 2010 MNA EVALUATION<br>W.G. KRUMMRICH FACILITY<br>SAUGET, ILLINOIS      |   | PROJECT NO.<br><br>21562401 |
| <b>URS</b>  |   |                             |
| DRN. BY: dab July 2010<br>DSGN. BY: ekf<br>CHKD. BY: <i>[Signature]</i> | Benzene Concentration Map –<br>2nd Quarter 2006 | FIG. NO.<br><br>4           |



File: P:\ENVIRONMENTAL\SOLUTIONS\W.G. KRUMMRICH\LONG-TERM\2010 MNA EVALUATION\FIG 5\_1010 BENZENE CONCENTRATION MAP.DWG Last edited: 07/27/10 © 1023 c.m. WC-ST. LOUIS, MO

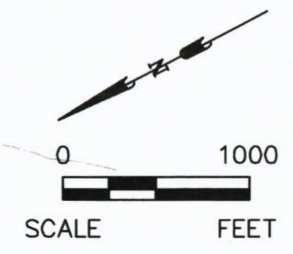


LEGEND

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- ◆ OTHER MONITORING WELL USED FOR GROUNDWATER CONTOURING
- ▲ PIEZOMETER CLUSTER USED FOR GROUNDWATER CONTOURING
- 100— MONOCHLOROBENZENE CONCENTRATION CONTOUR (ug/L)

NOTES:

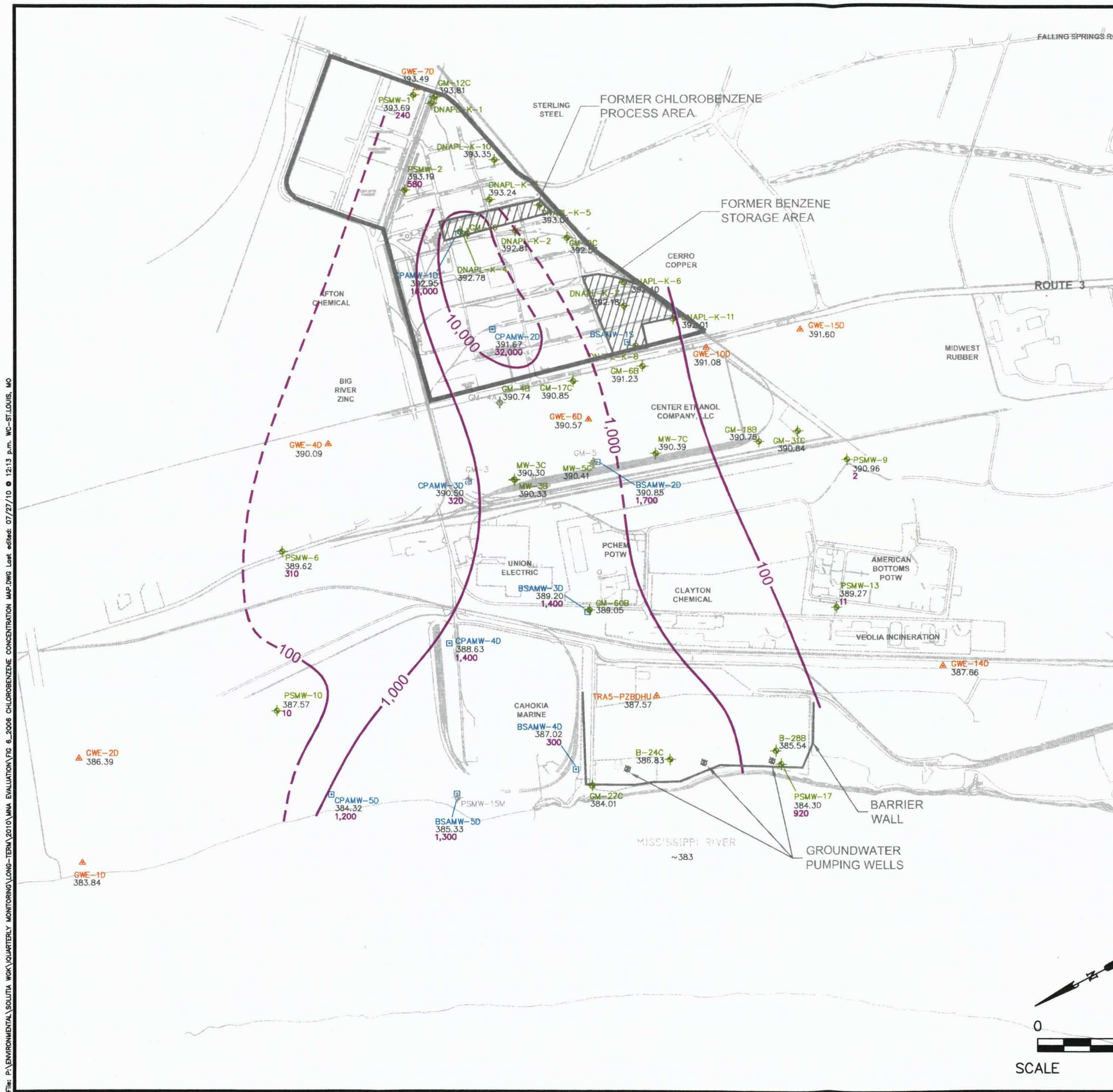
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| URS  |   |                         |               |
| DRN. BY:chs July 2010<br>DSGN. BY:dp<br>CHKD. BY: <i>[Signature]</i> | Benzene Concentration Map –<br>1st Quarter 2010 |                         | FIG. NO.<br>5 |



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- LEGEND
- LONG-TERM MONITORING WELL USED FOR GROUNDWATER CONTOURING
  - ★ OTHER MONITORING WELL USED FOR GROUNDWATER CONTOURING
  - ▲ PIEZOMETER CLUSTER USED FOR GROUNDWATER CONTOURING
  - 100 — MONOCHLOROBENZENE CONCENTRATION CONTOUR (ug/L)

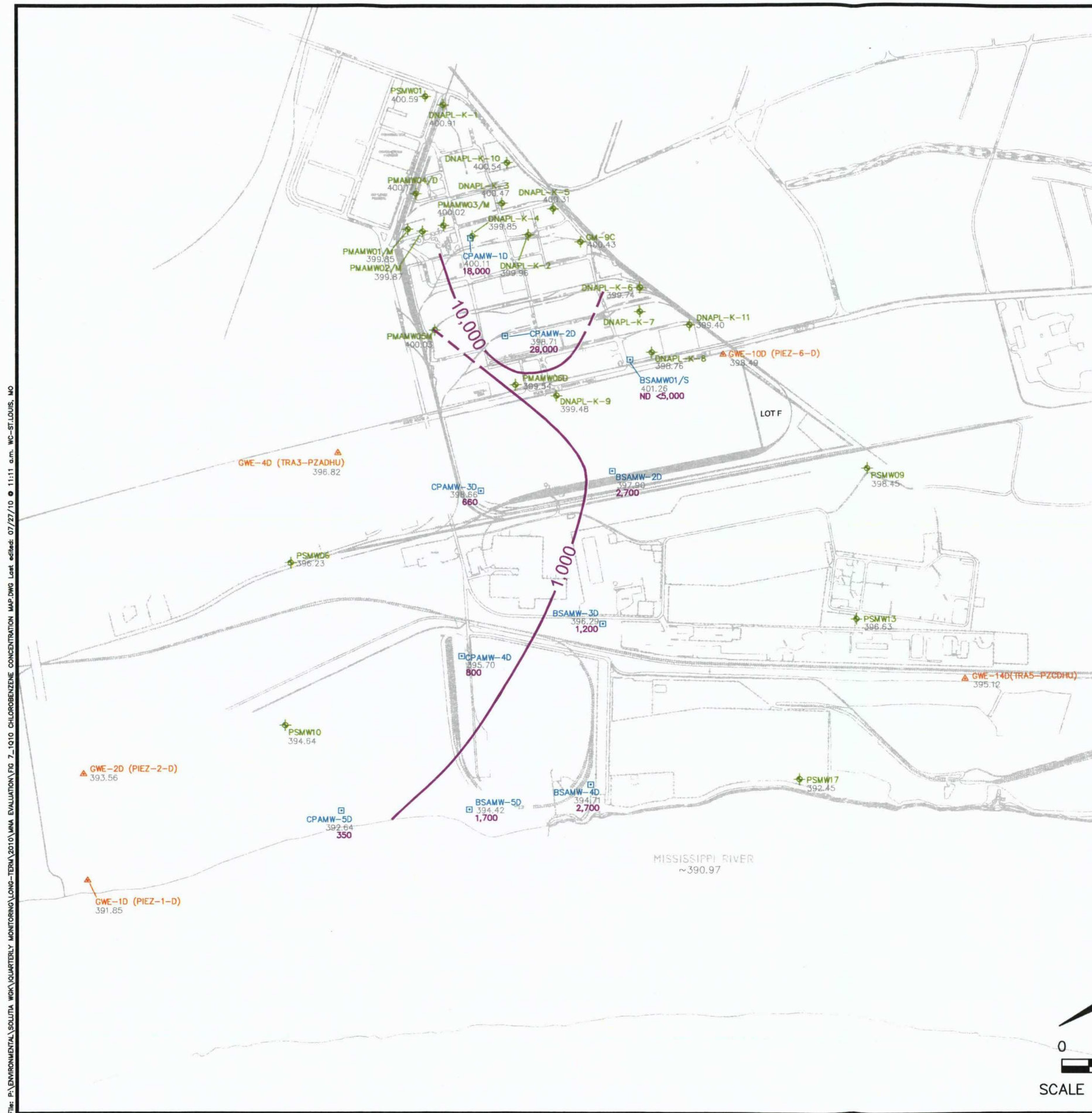
NOTES:

1) CONTOURS GENERATED BASED ON PROFESSIONAL JUDGEMENT.

|   |   |                             |
|---|---|-----------------------------|
| 2010 MNA EVALUATION<br>W.G. KRUMMRICH FACILITY<br>SAUGET, ILLINOIS    |   | PROJECT NO.<br><br>21562401 |
| <b>URS</b>  |   |                             |
| DRN. BY:dab July 2010<br>DSGN. BY:ekf<br>CHKD. BY: <i>[Signature]</i> | Chlorobenzene Concentration Map –<br>2nd Quarter 2006 | FIG. NO.<br><br>6           |



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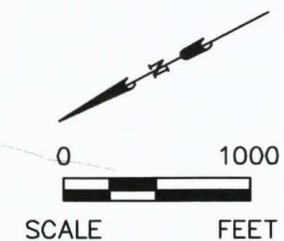


#### LEGEND

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- ◆ OTHER MONITORING WELL USED FOR GROUNDWATER CONTOURING
- ▲ PIEZOMETER CLUSTER USED FOR GROUNDWATER CONTOURING
- 100— MONOCHLOROBENZENE CONCENTRATION CONTOUR (ug/L)

#### NOTES:

CONTOURS GENERATED BASED ON PROFESSIONAL JUDGEMENT.



2010 MNA EVALUATION  
W.G. KRUMMRICH FACILITY  
SAUGET, ILLINOIS

PROJECT NO.  
21562401

**URS**

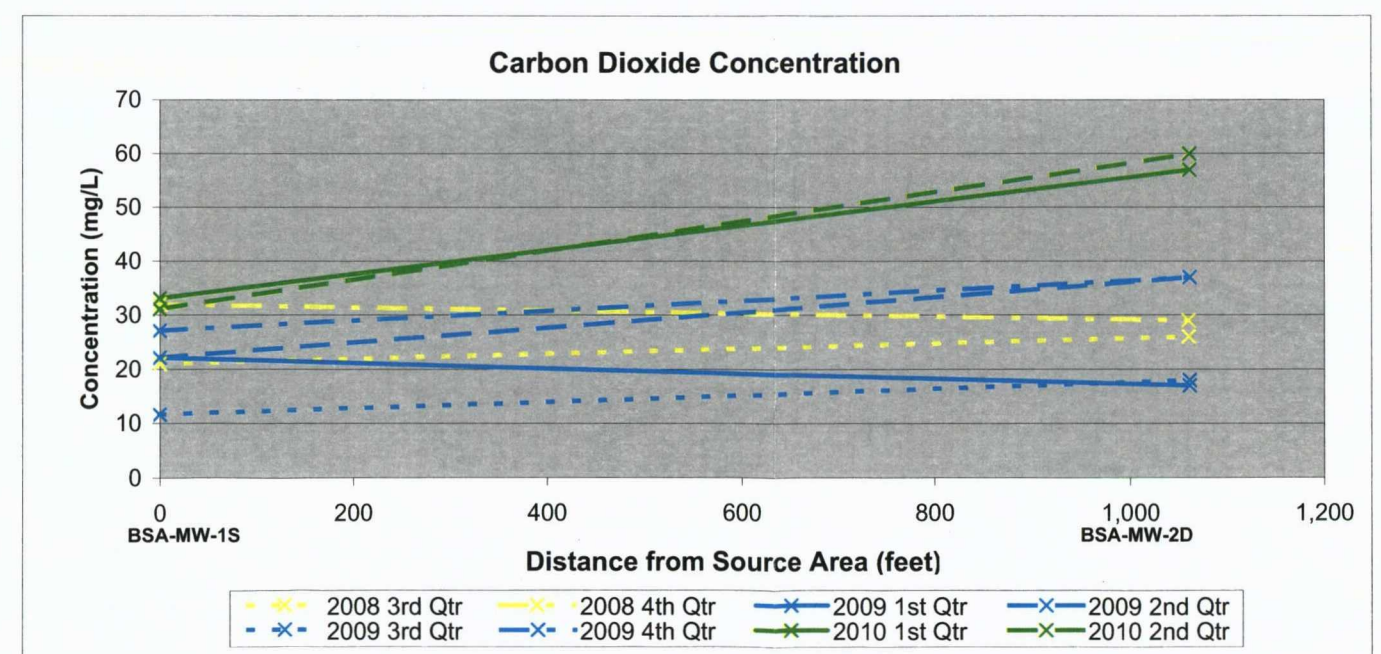
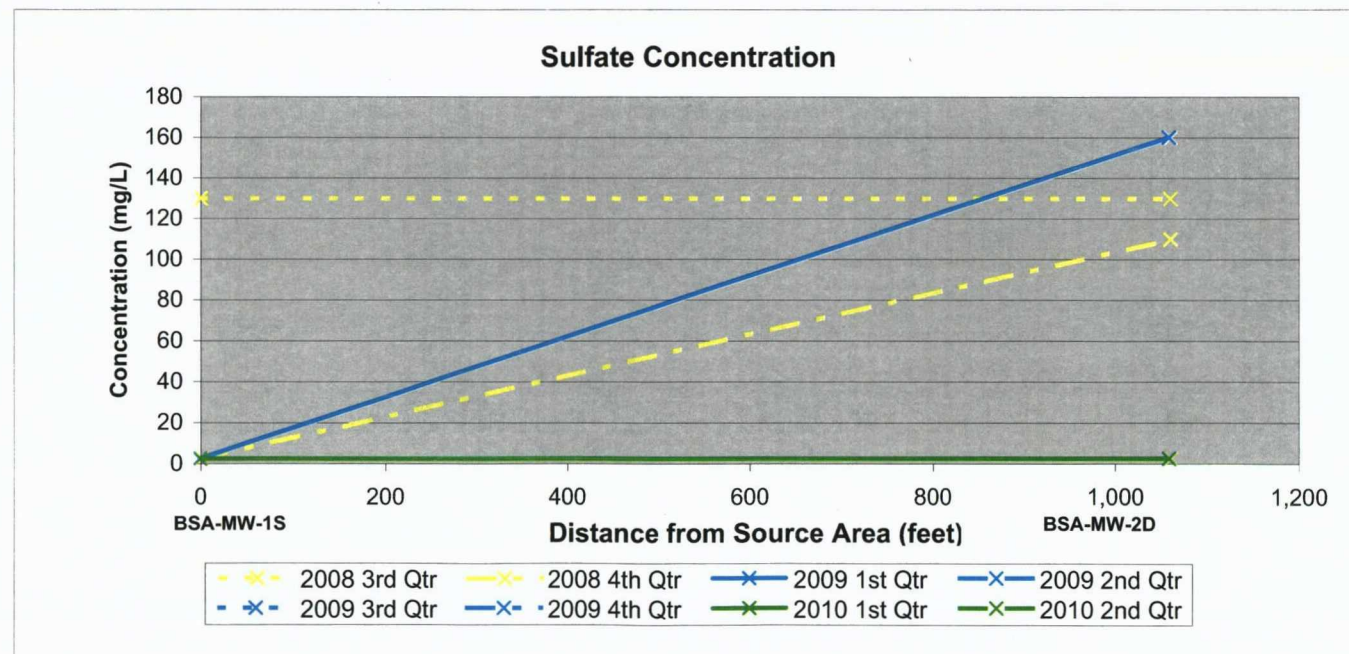
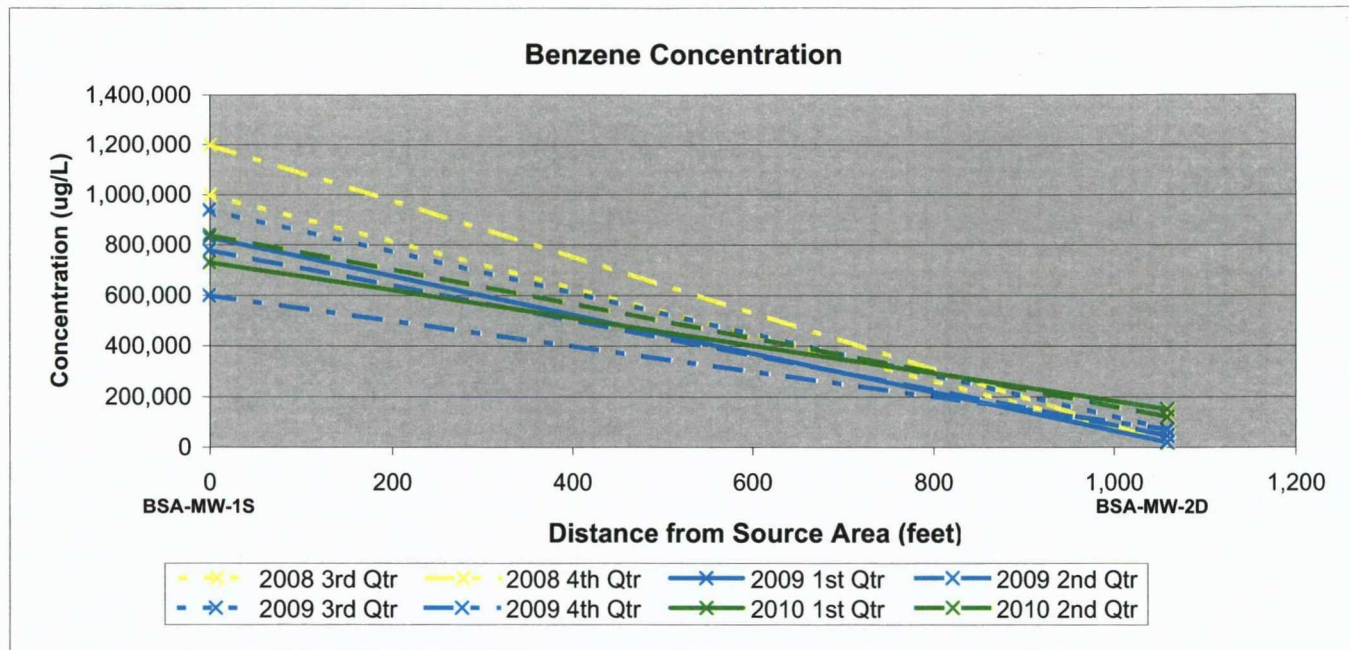
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CHKD. BY:

Chlorobenzene Concentration Map  
1st Quarter 2010

FIG. NO.  
7

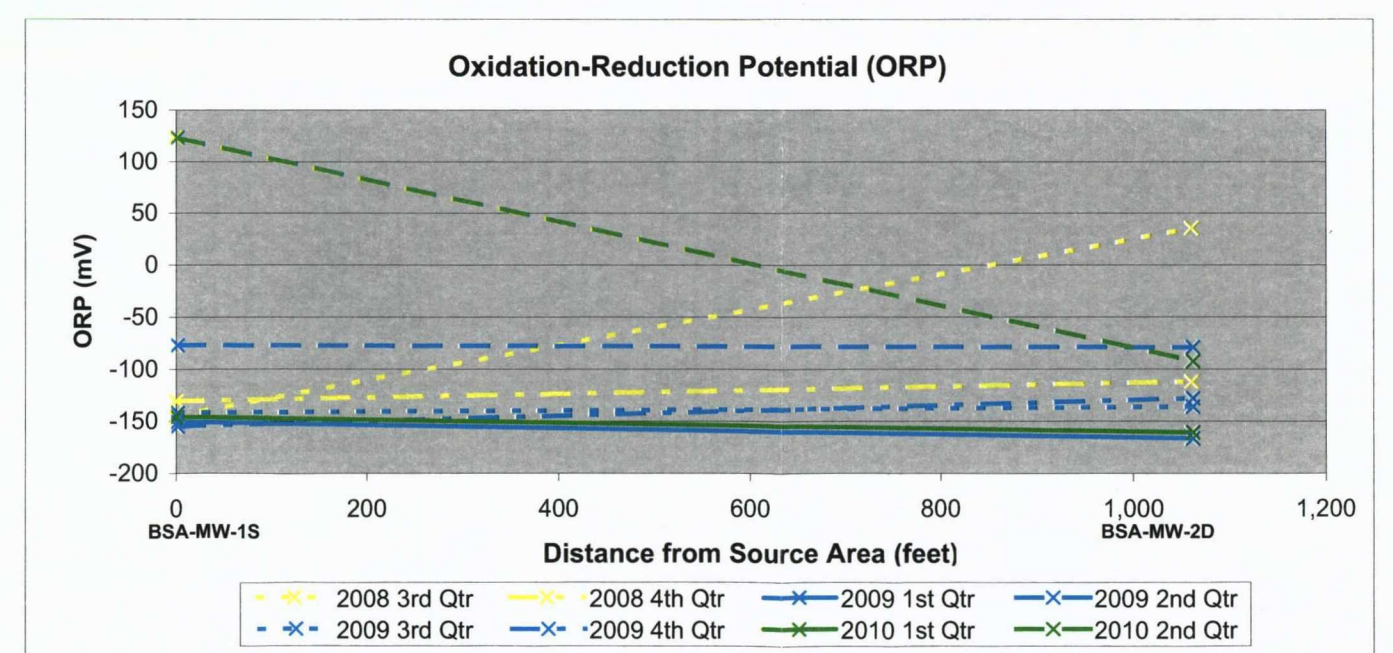
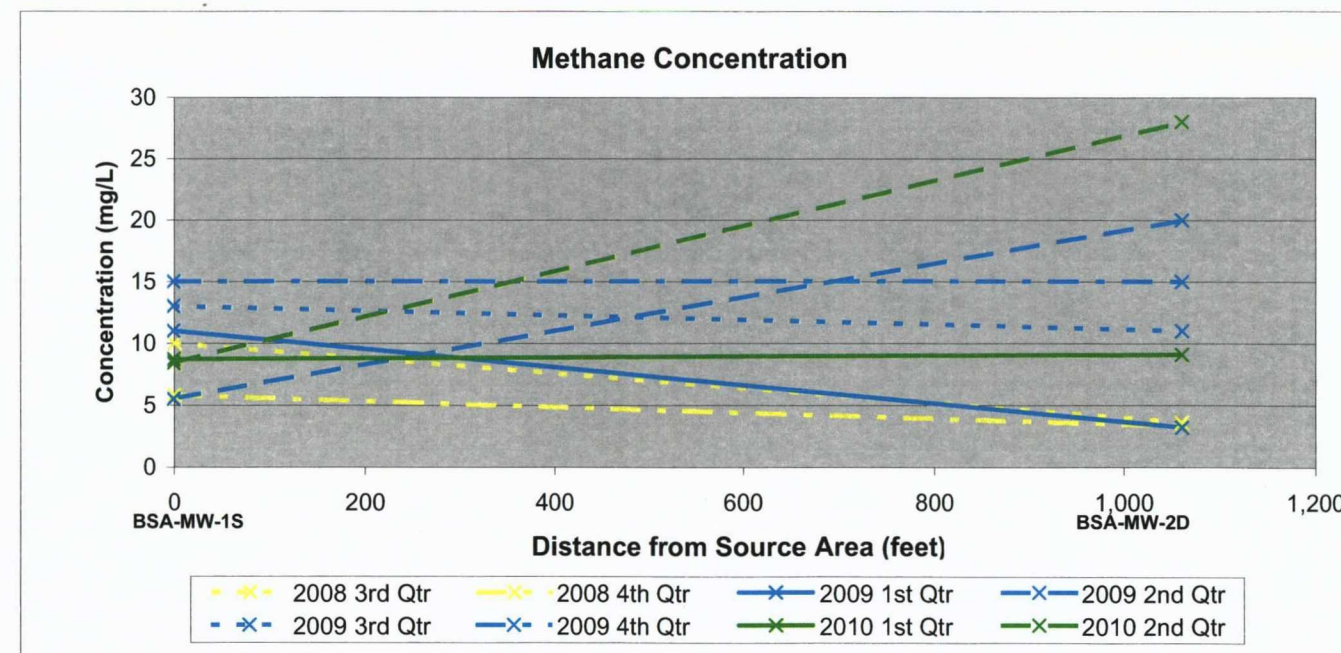
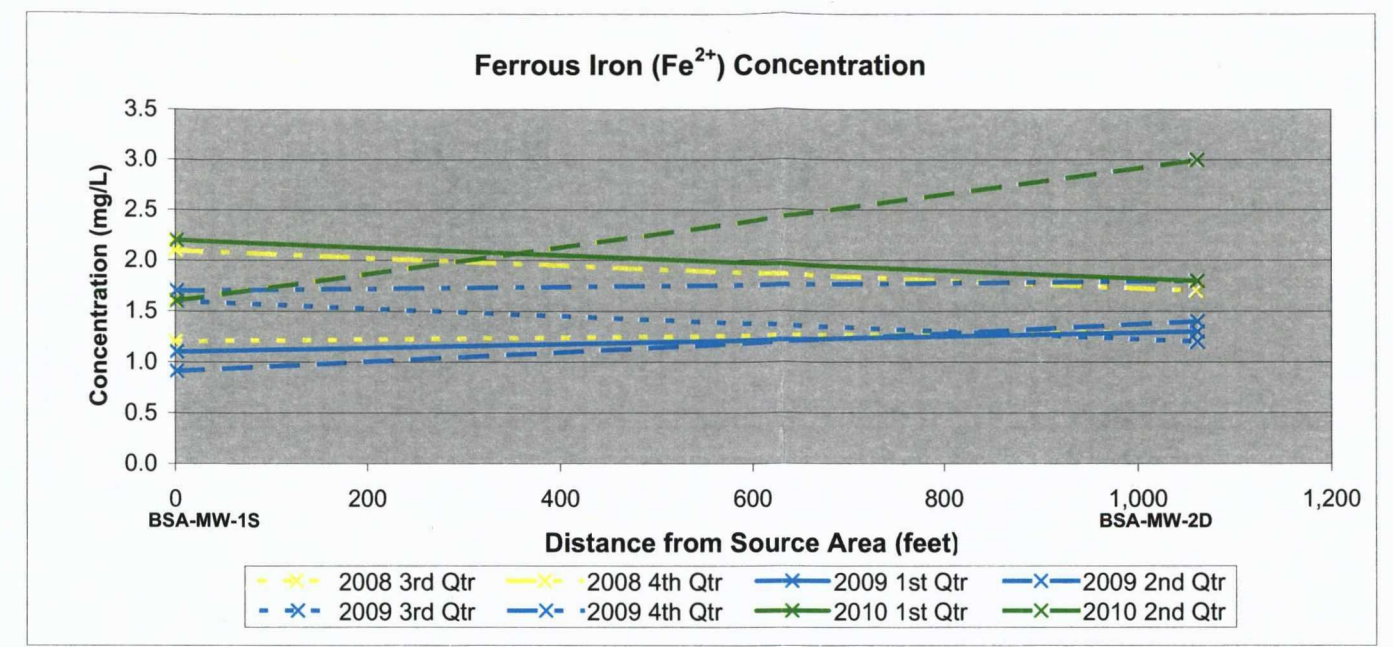
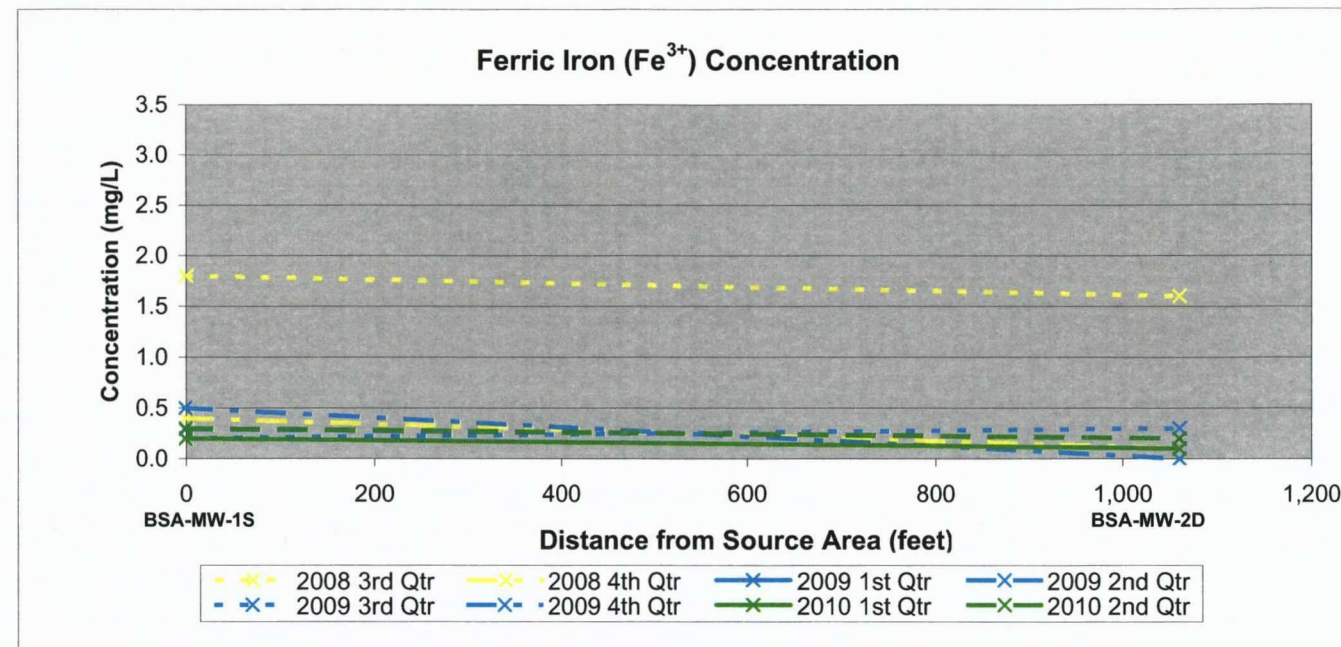


# **BENZENE STORAGE AREA PLUME -- TRENDS WITH DISTANCE** **(BSA-MW-1S to BSA-MW-2D)**



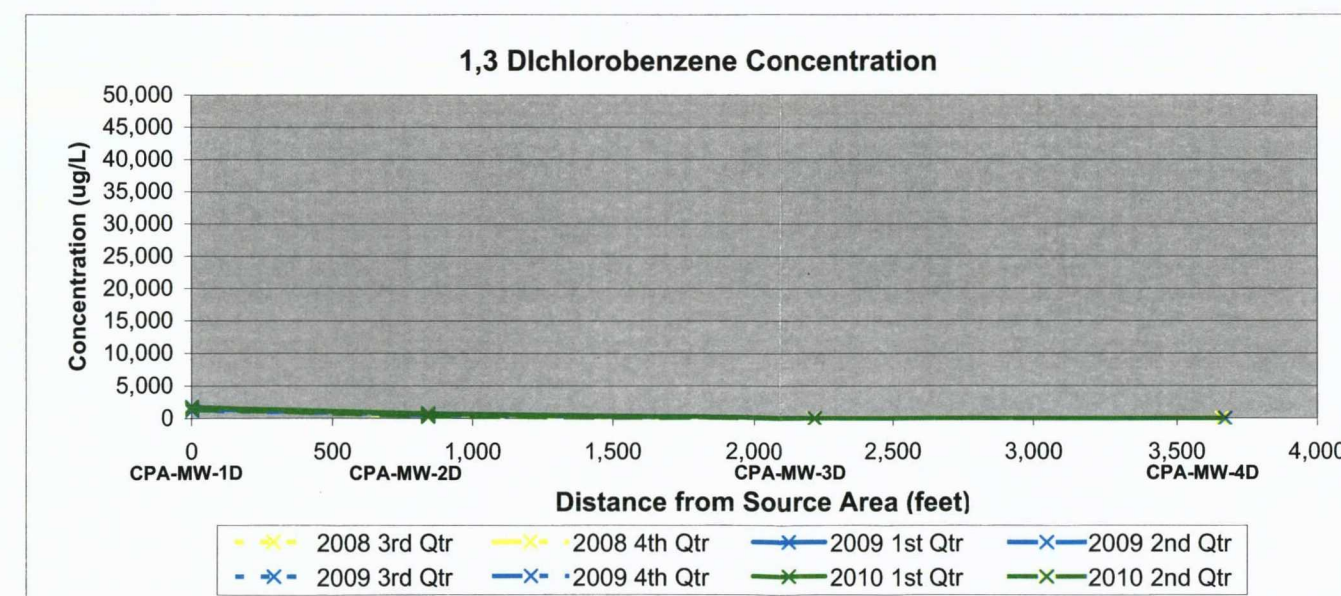
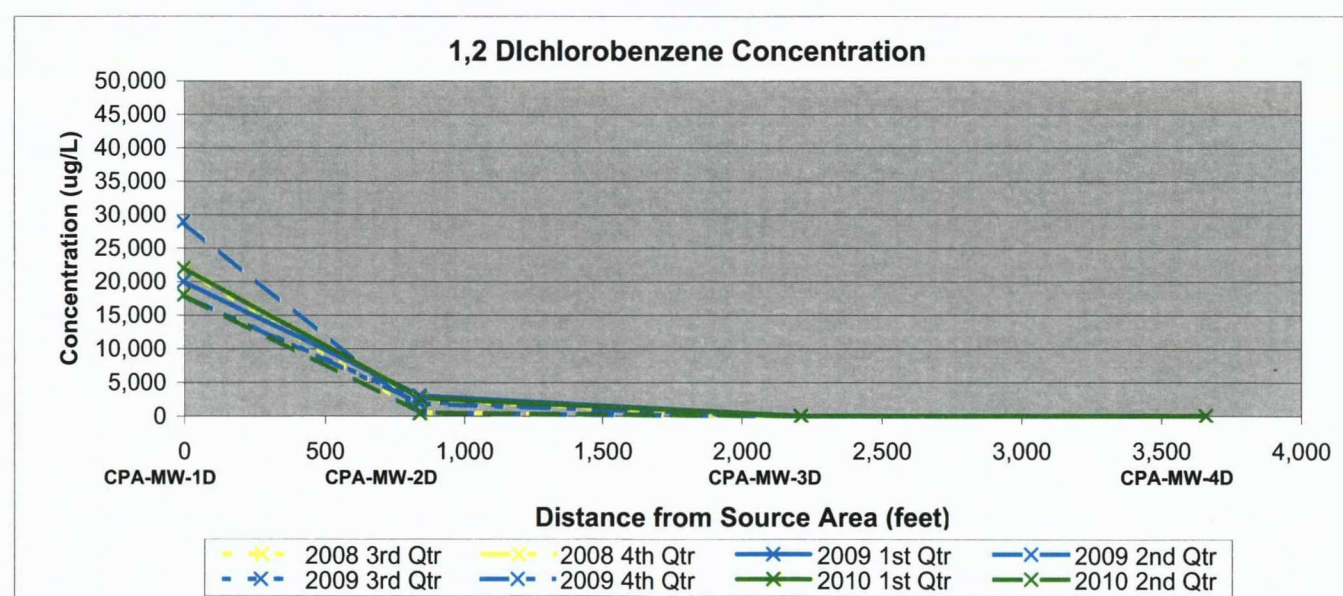
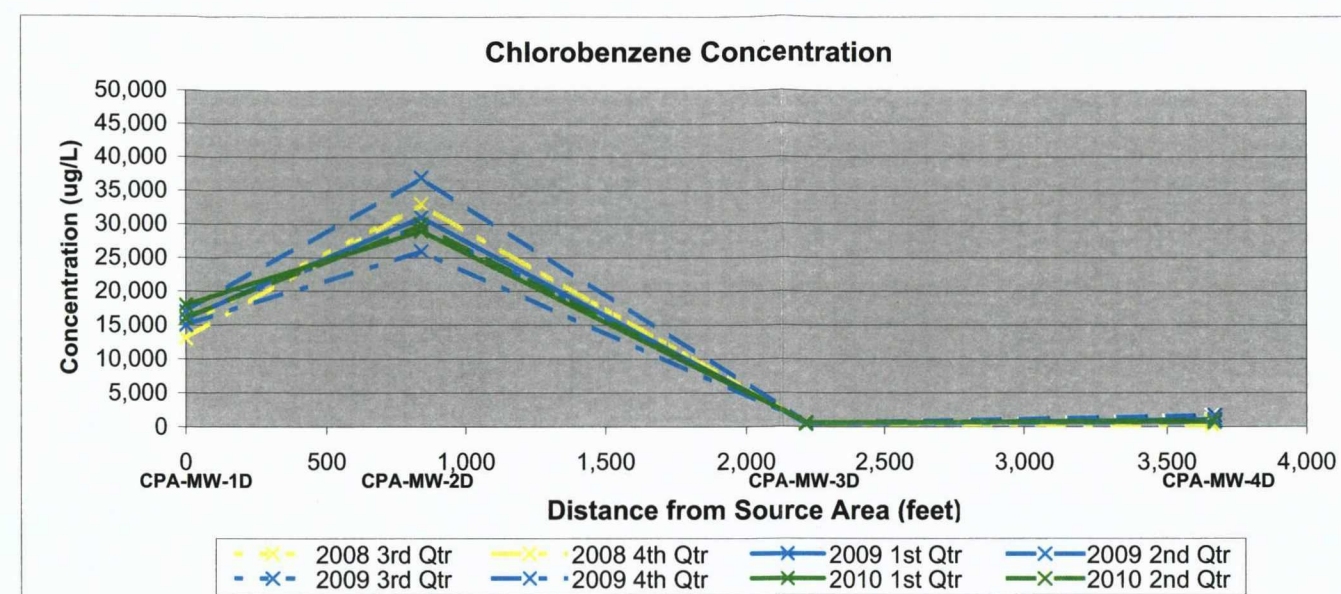
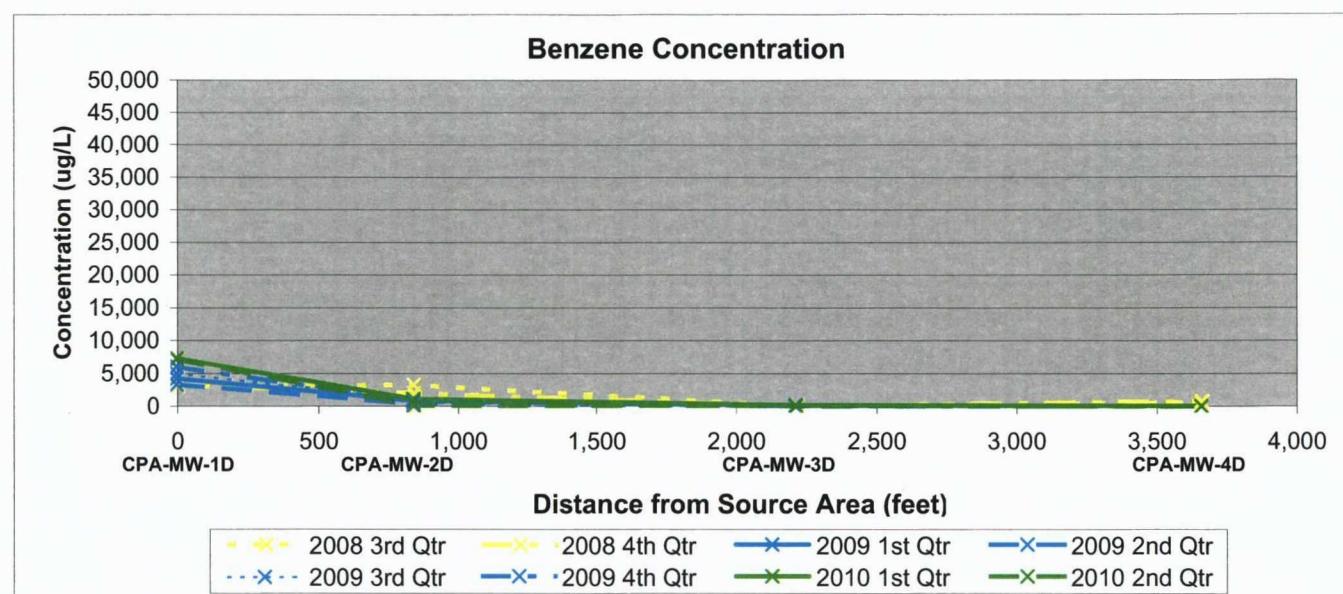


# **BENZENE STORAGE AREA PLUME -- TRENDS WITH DISTANCE** (BSA-MW-1S to BSA-MW-2D)



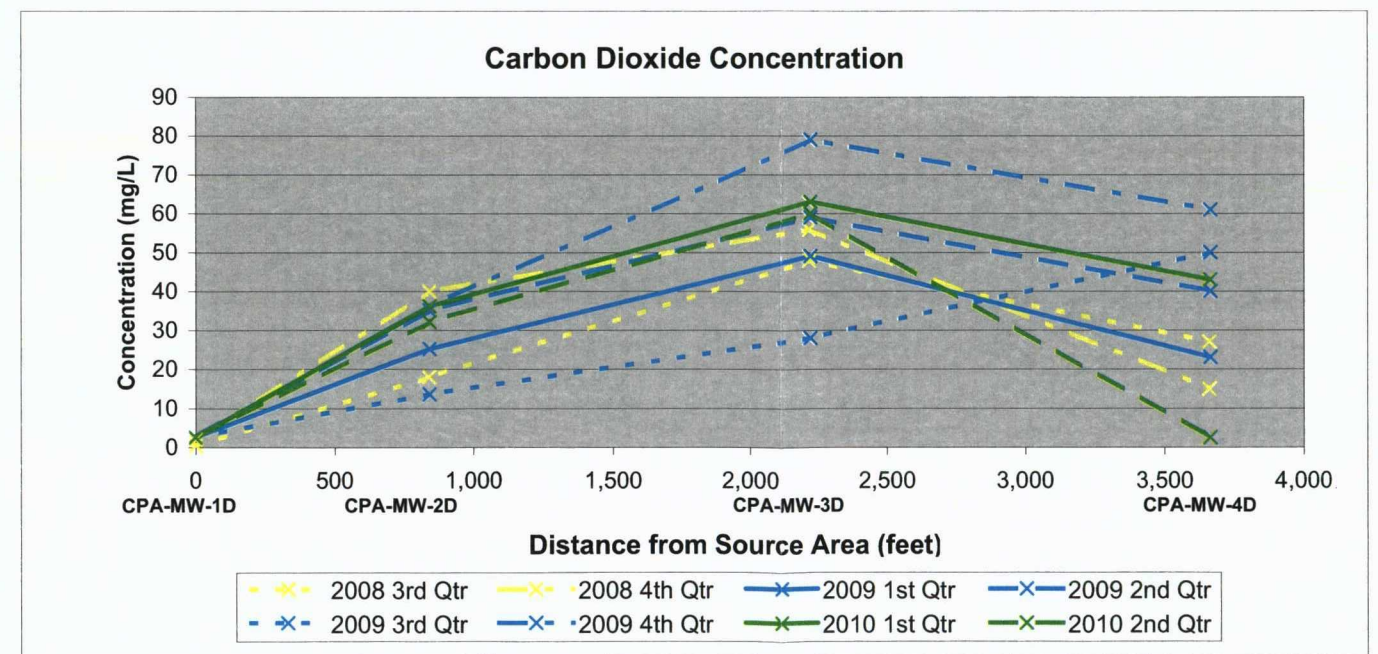
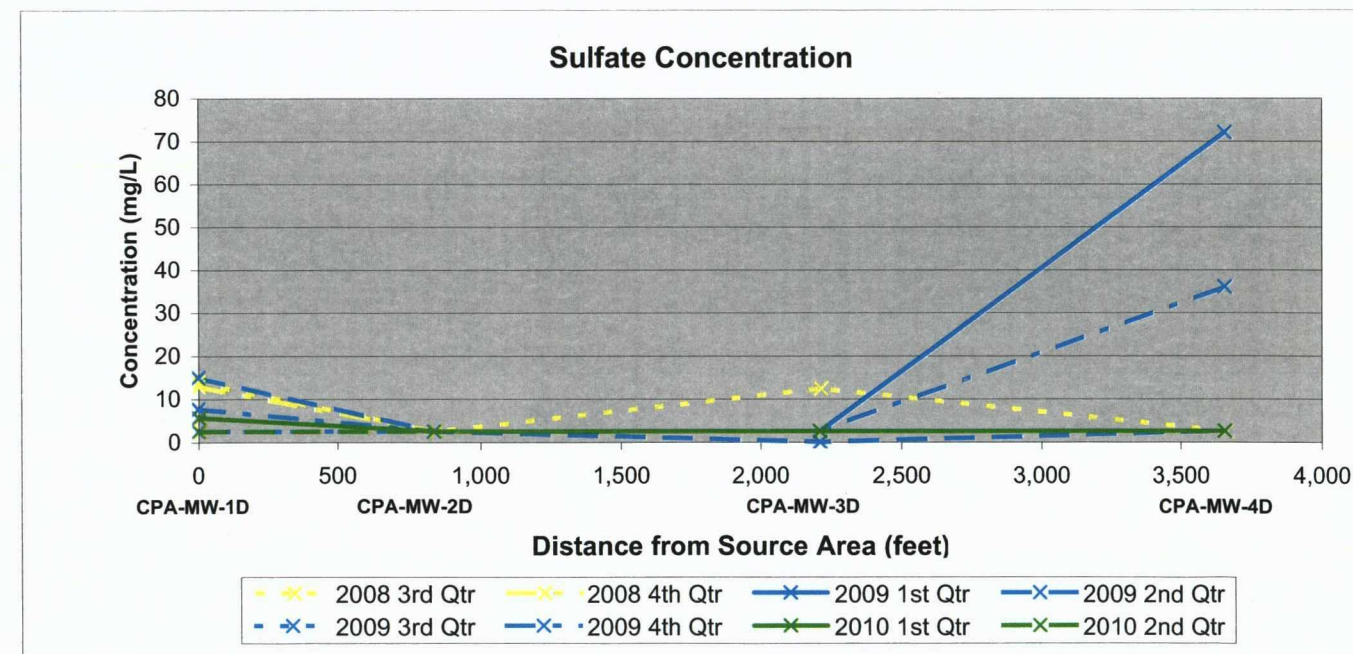
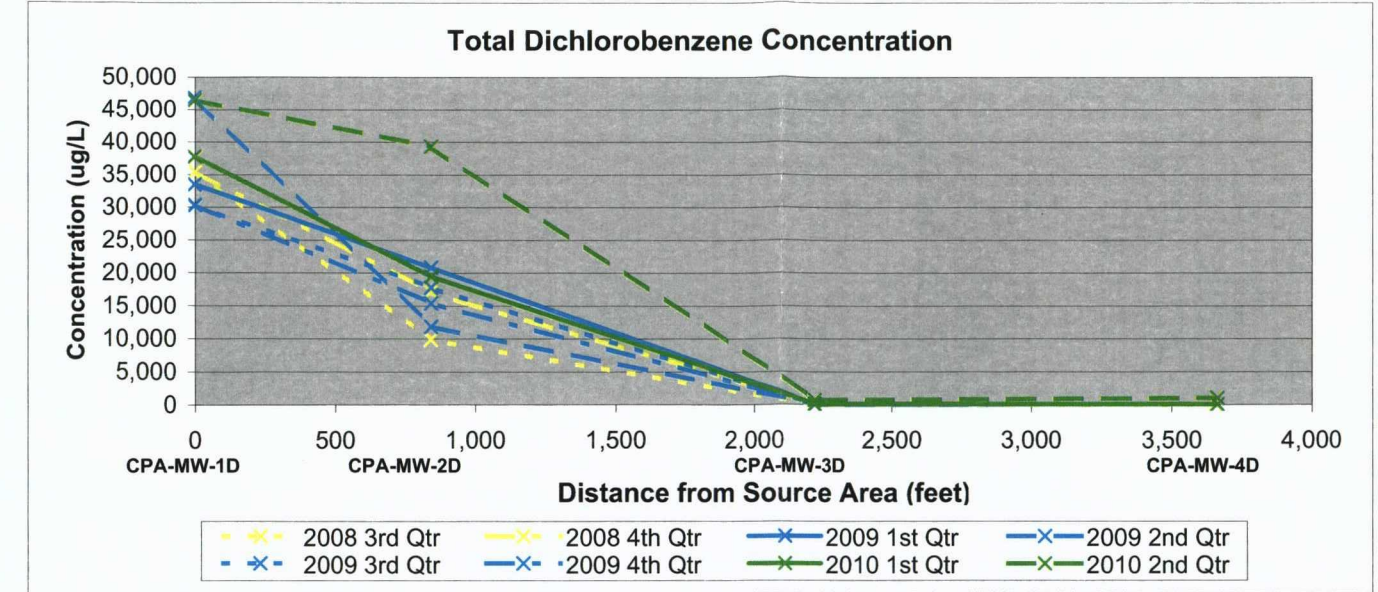
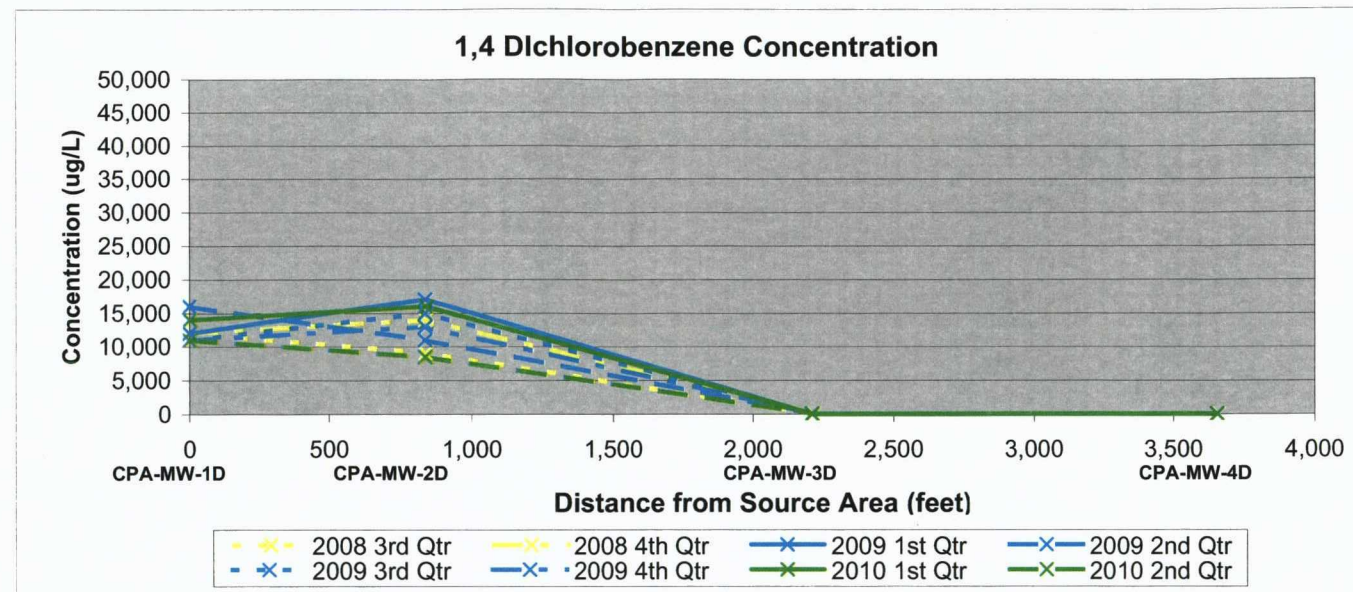


# **CHLOROBENZENE PROCESS AREA (CPA) PLUME -- TRENDS WITH DISTANCE** **(CPA-MW-1D to CPA-MW-2D to CPA-MW-3D to CPA-MW-4D)**



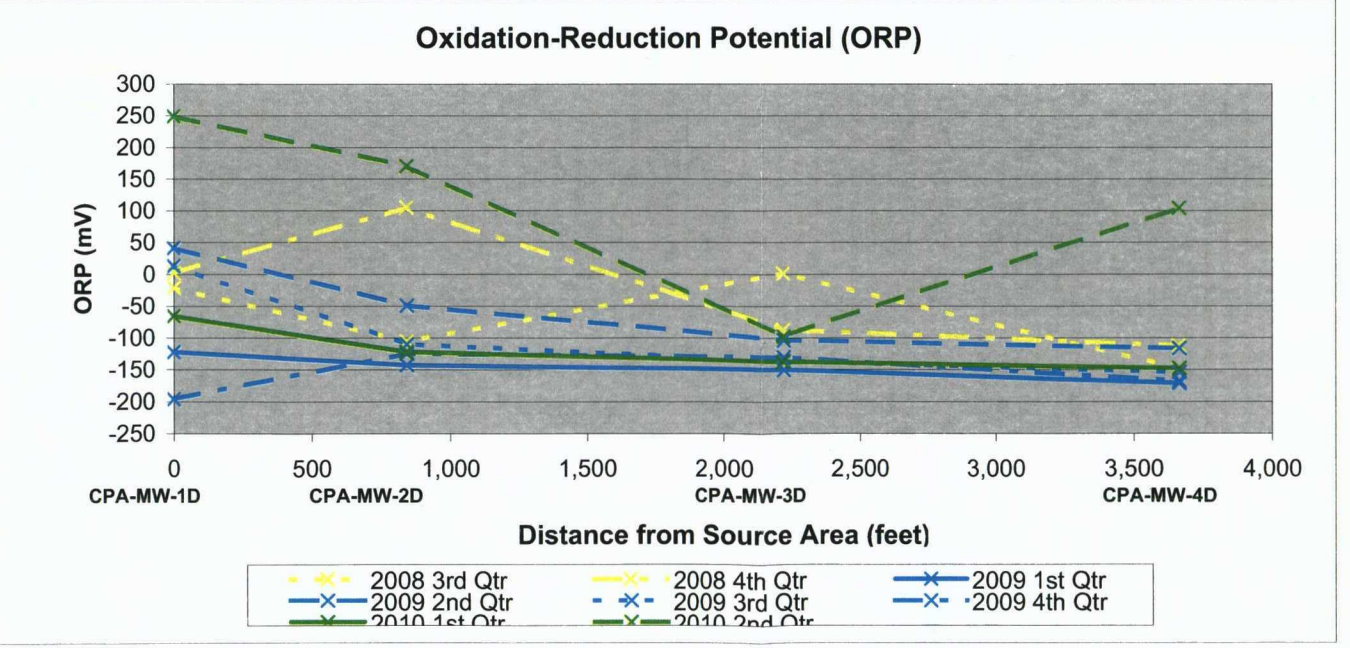
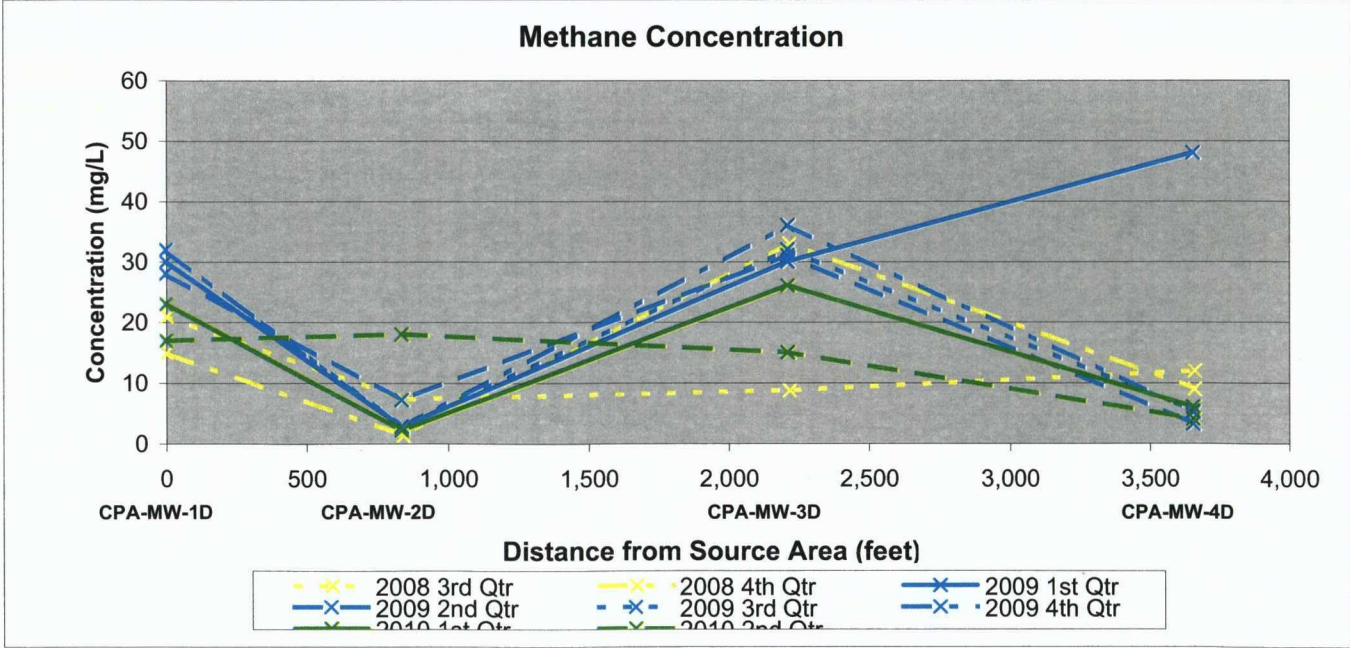
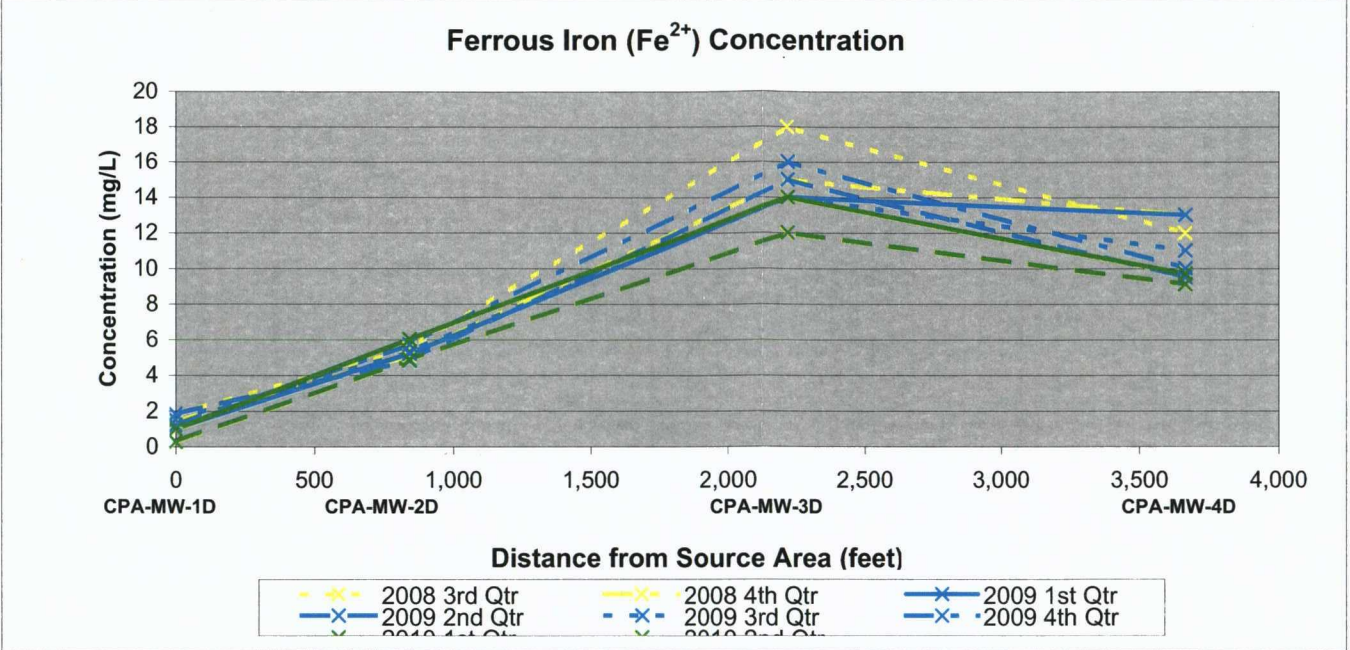
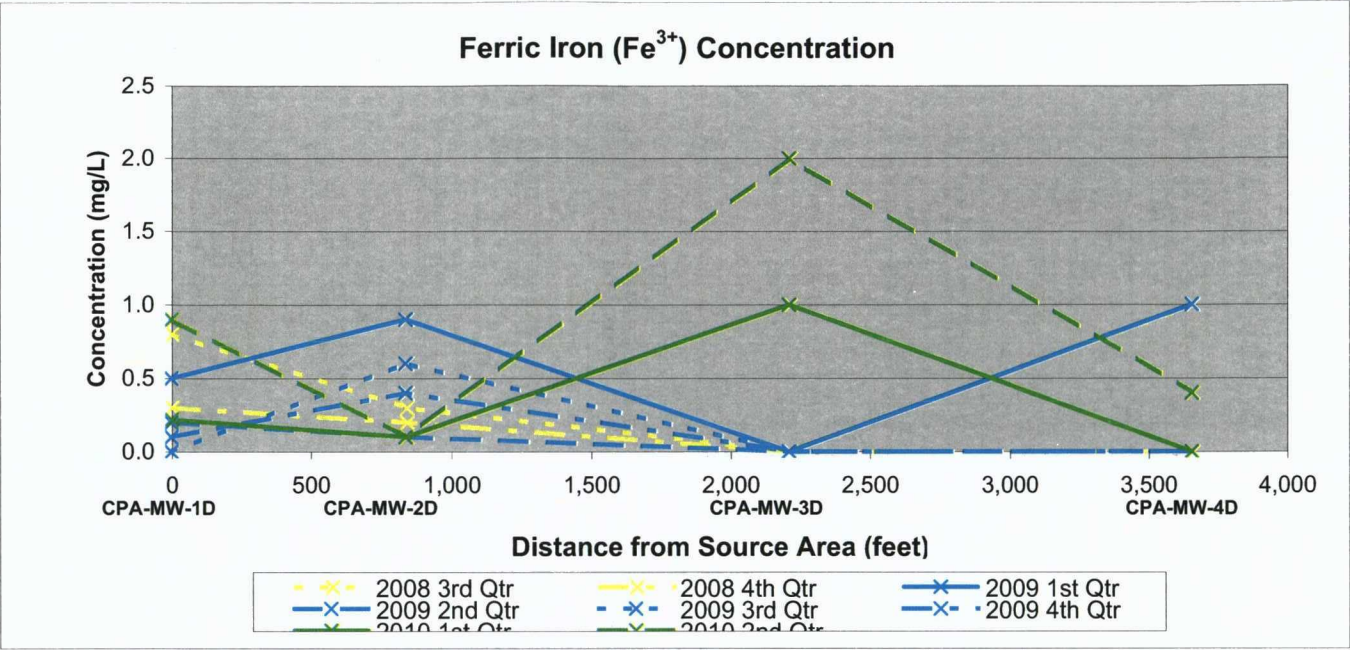


# **CHLOROBENZENE PROCESS AREA (CPA) PLUME -- TRENDS WITH DISTANCE** **(CPA-MW-1D to CPA-MW-2D to CPA-MW-3D to CPA-MW-4D)**





# **CHLOROBENZENE PROCESS AREA (CPA) PLUME -- TRENDS WITH DISTANCE** **(CPA-MW-1D to CPA-MW-2D to CPA-MW-3D to CPA-MW-4D)**

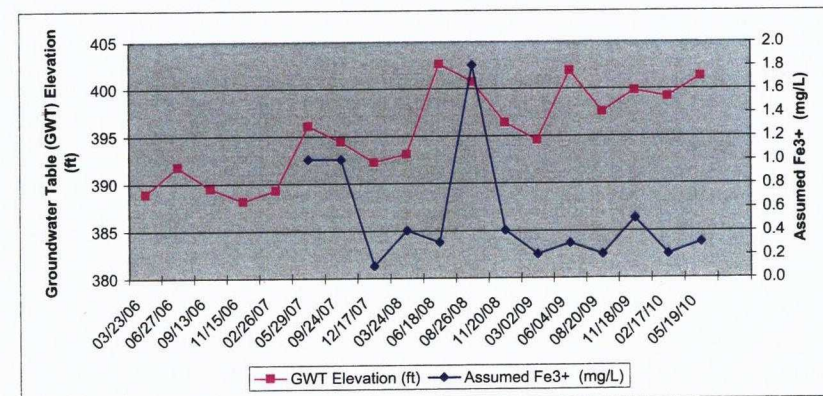
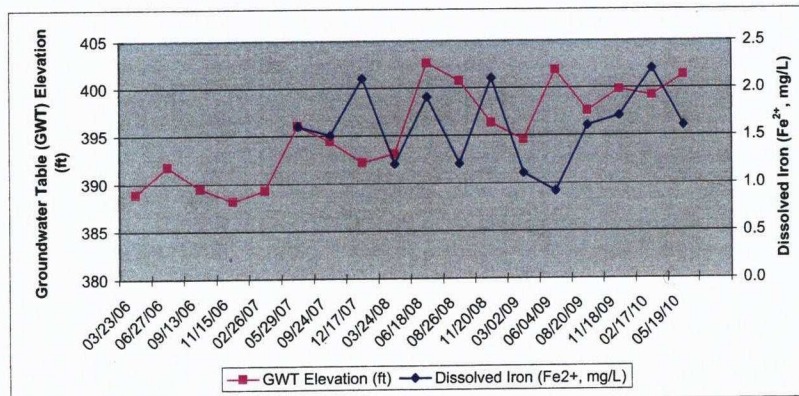
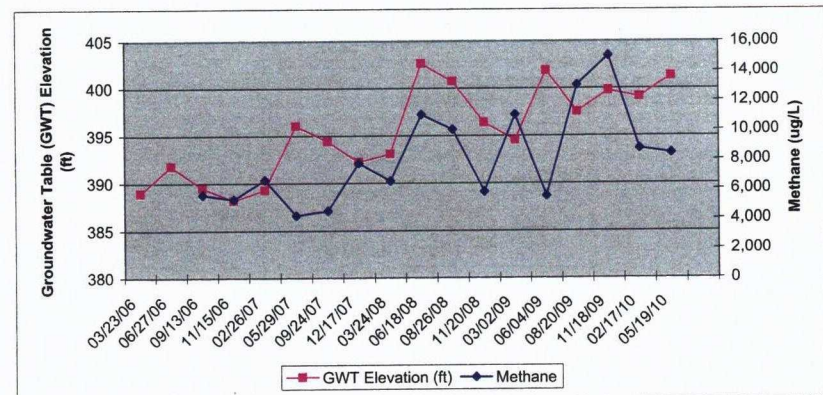
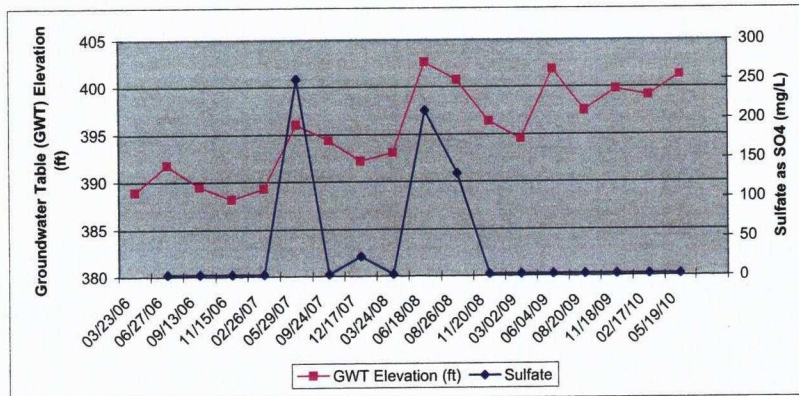
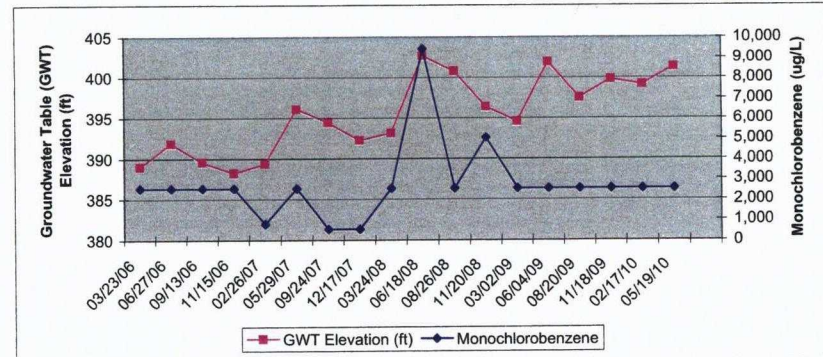
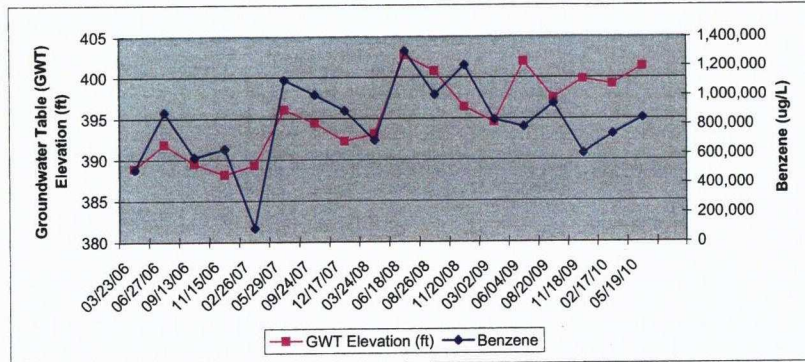


**FIGURE 9**

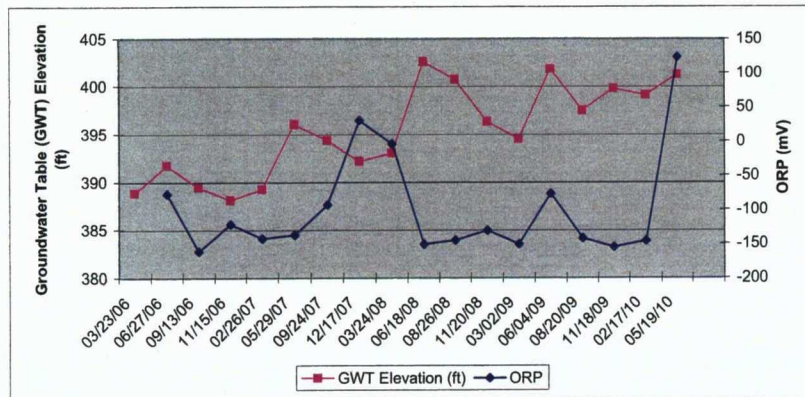
## **Attachment A**



**ATTACHMENT A**  
**Supporting Data for MNA Evaluation 3Q08 through 2Q10**  
**Comparison of COI and MNA Parameters to Groundwater Levels over Time**  
**Monitoring Well BSA-MW-1**

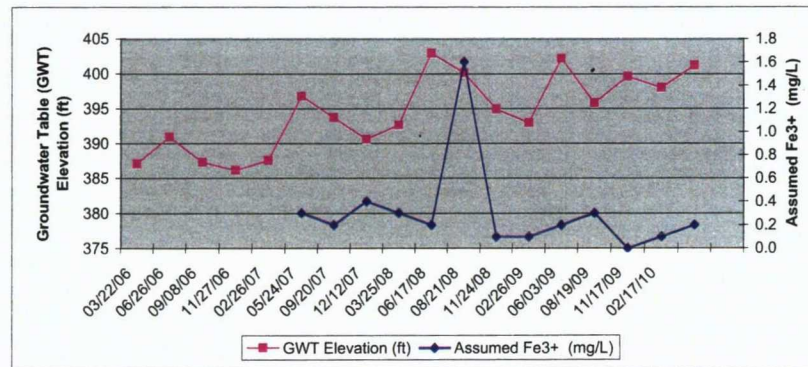
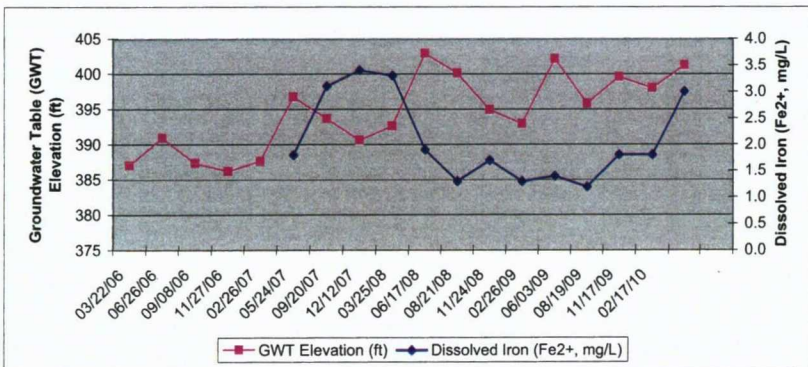
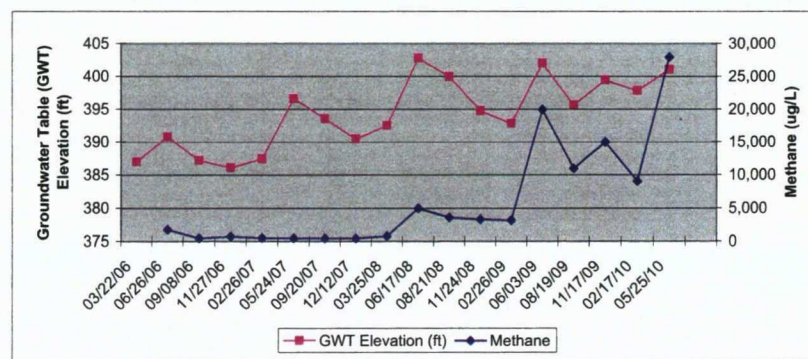
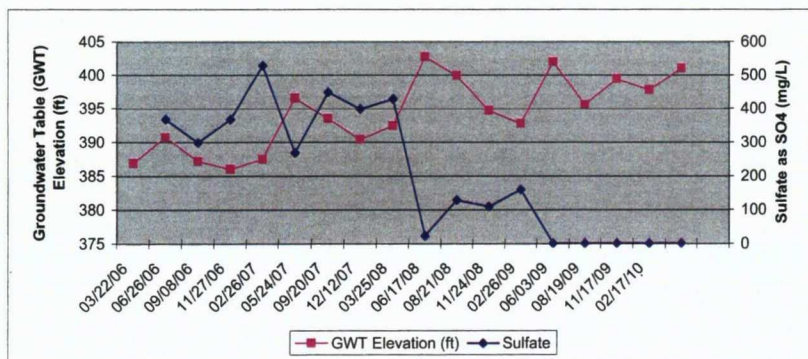
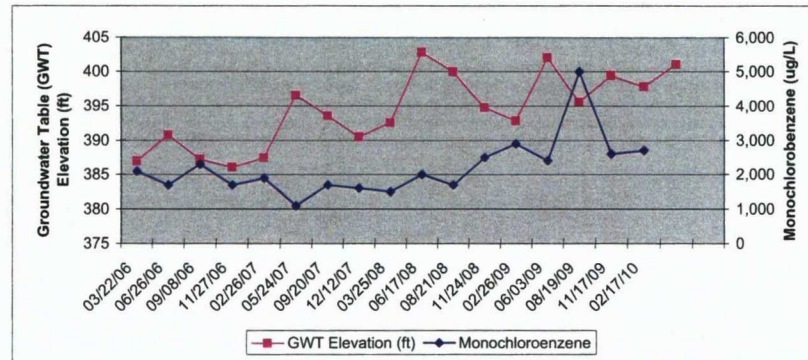
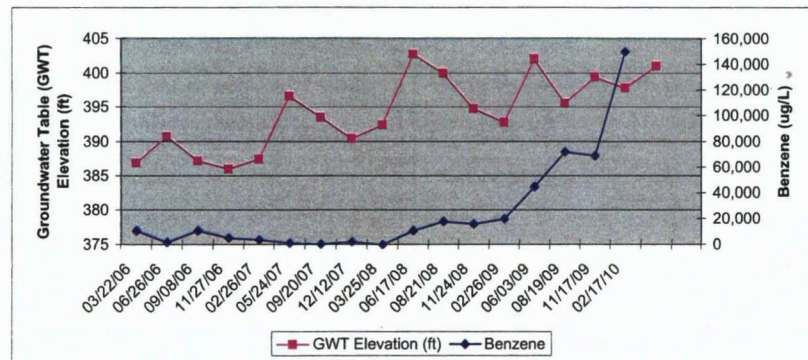


**ATTACHMENT A**  
 Supporting Data for MNA Evaluation 3Q08 through 2Q10  
 Comparison of COI and MNA Parameters to Groundwater Levels over Time  
 Monitoring Well BSA-MW-1

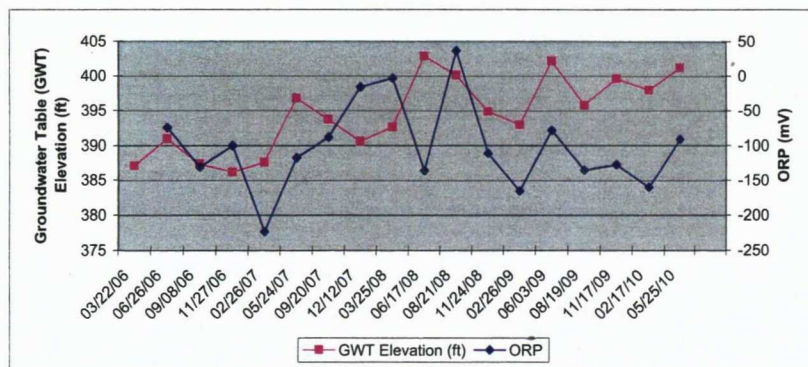




**ATTACHMENT A**  
**Supporting Data for MNA Evaluation 3Q08 through 2Q10**  
**Comparison of COI and MNA Parameters to Groundwater Levels over Time**  
**Monitoring Well BSA-MW-2**

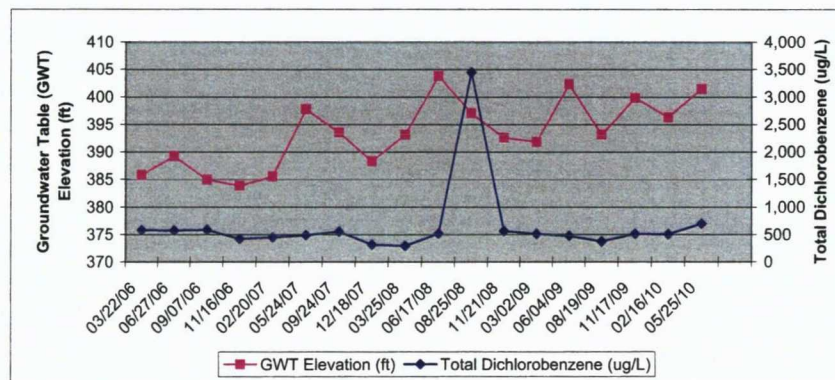
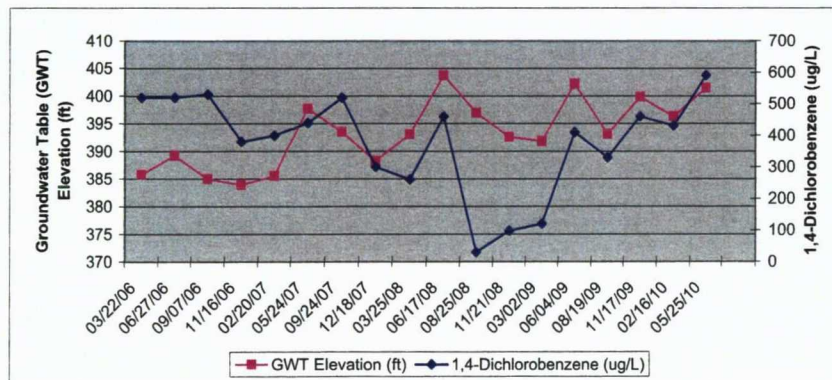
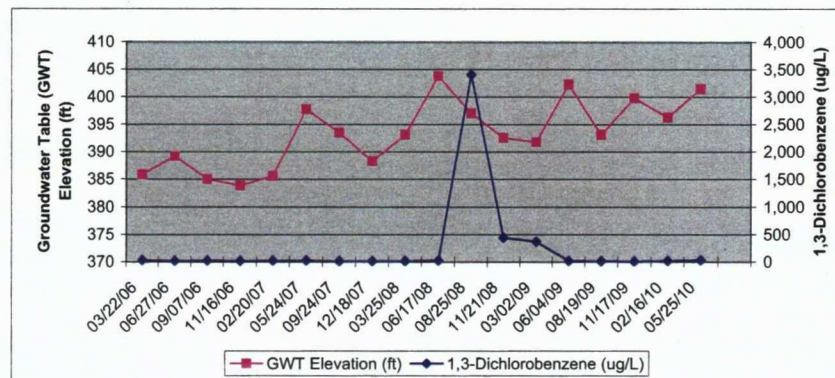
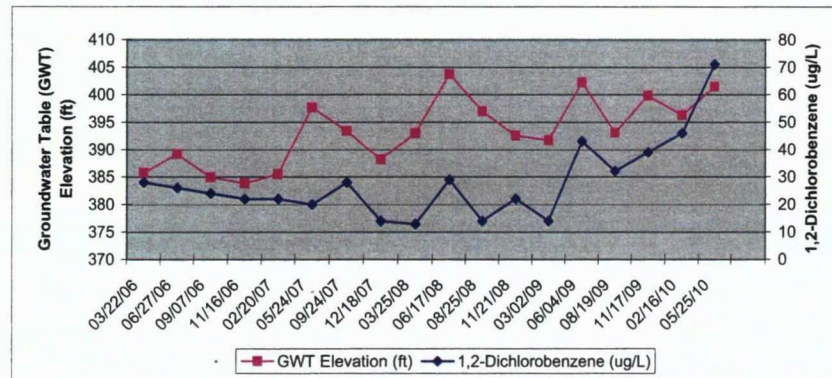
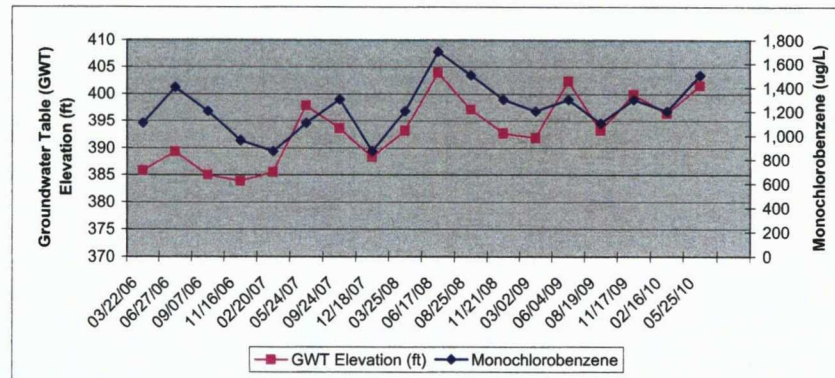
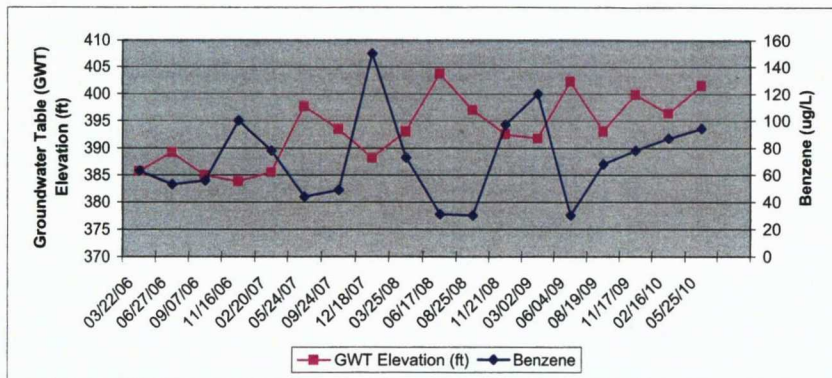


**ATTACHMENT A**  
**Supporting Data for MNA Evaluation 3Q08 through 2Q10**  
**Comparison of COI and MNA Parameters to Groundwater Levels over Time**  
**Monitoring Well BSA-MW-2**



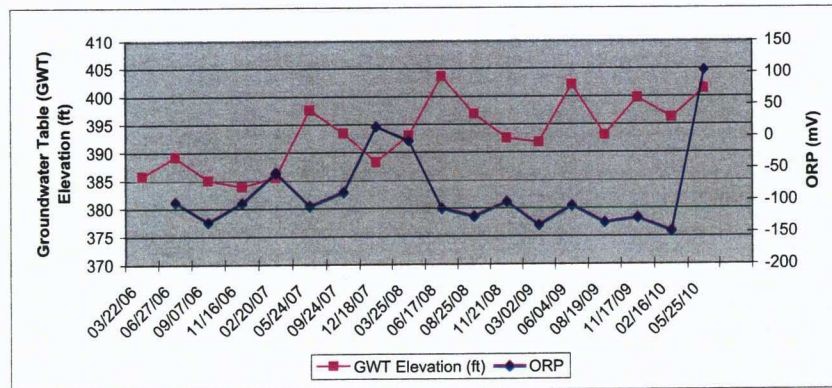
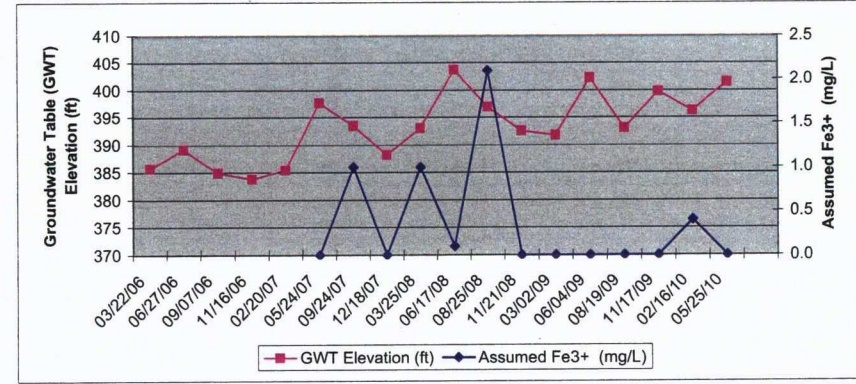
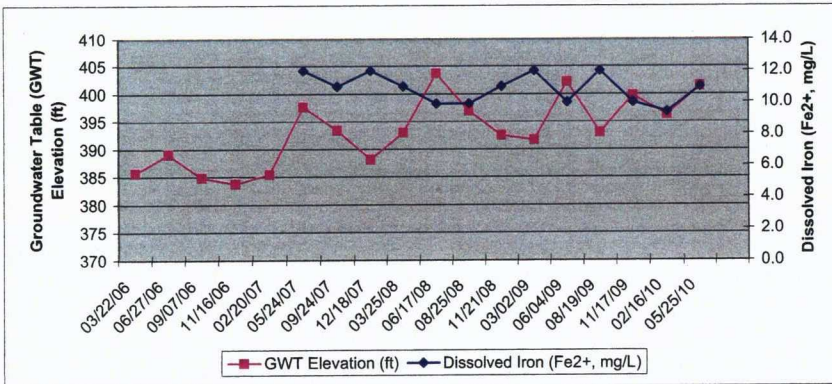
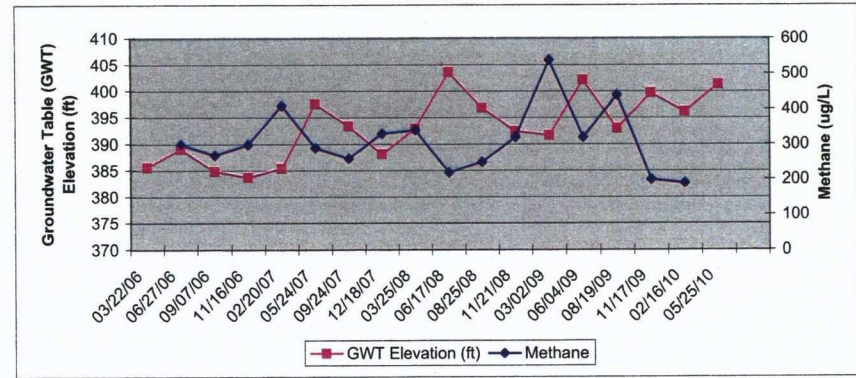
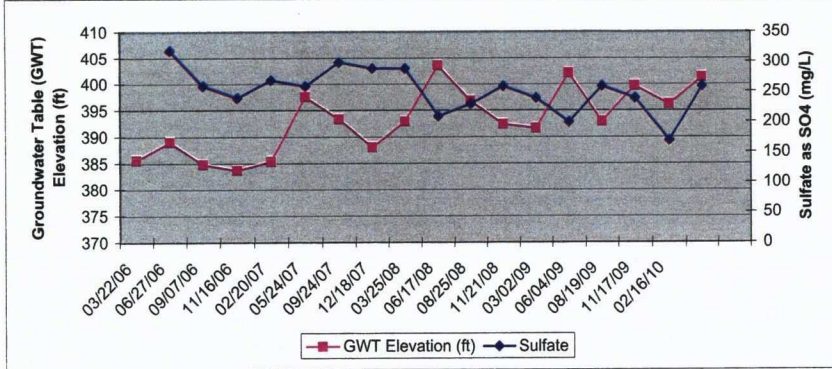


**ATTACHMENT A**  
**Supporting Data for MNA Evaluation 3Q08 through 2Q10**  
**Comparison of COI and MNA Parameters to Groundwater Levels over Time**  
**Monitoring Well BSA-MW-3**



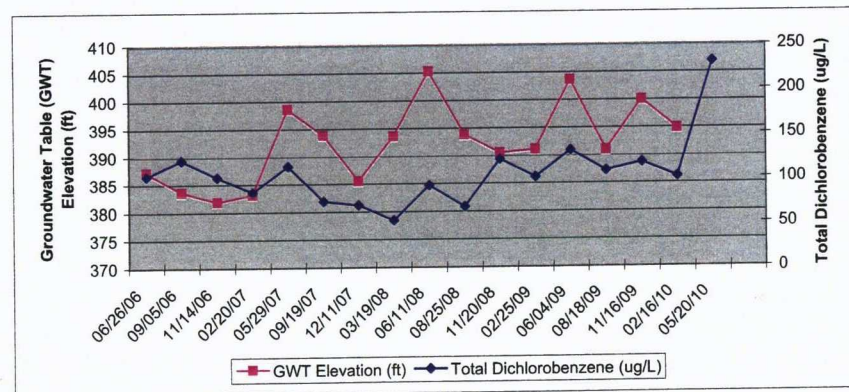
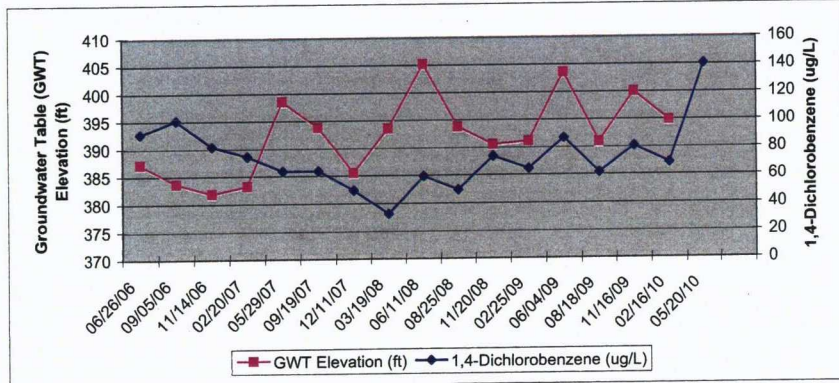
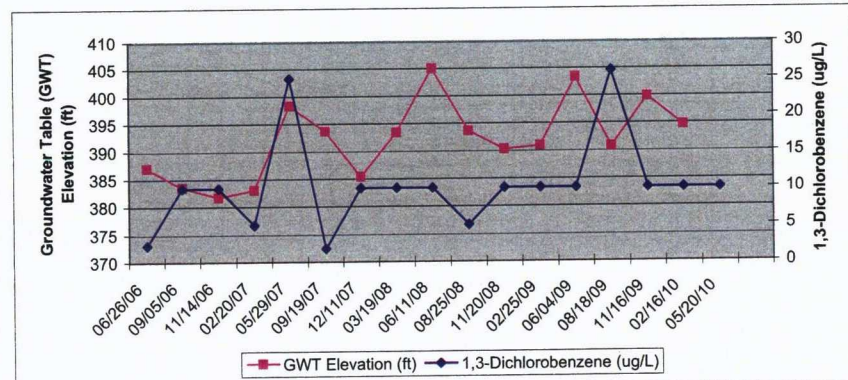
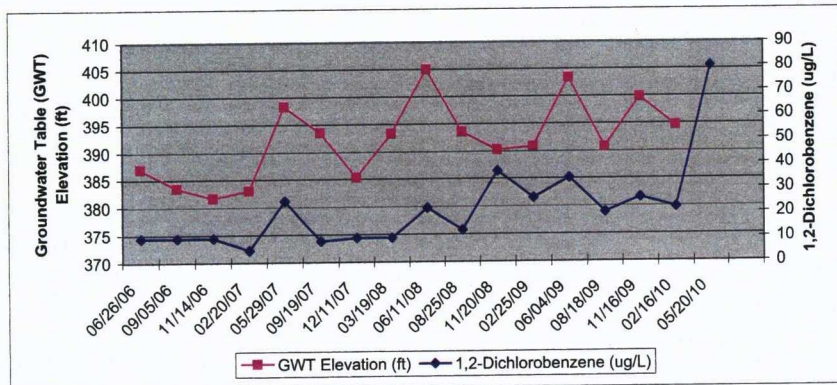
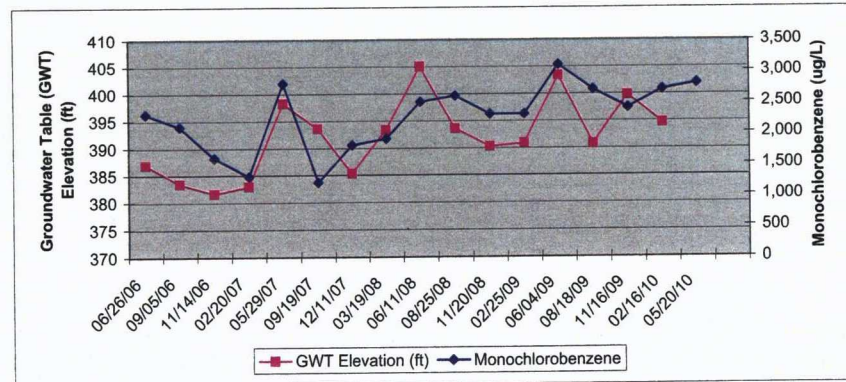
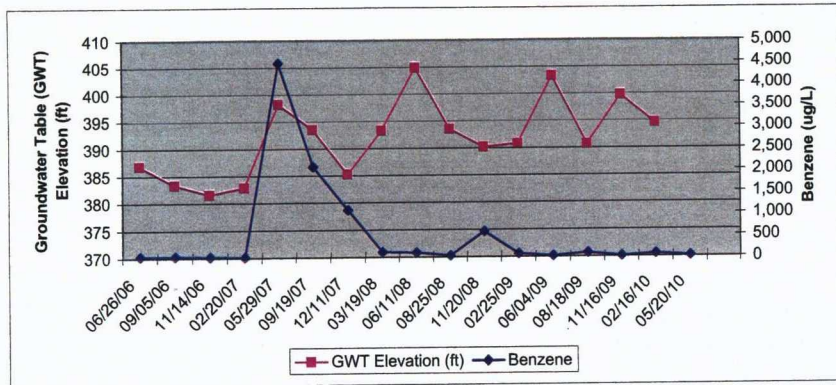


**ATTACHMENT A**  
**Supporting Data for MNA Evaluation 3Q08 through 2Q10**  
**Comparison of COI and MNA Parameters to Groundwater Levels over Time**  
**Monitoring Well BSA-MW-3**



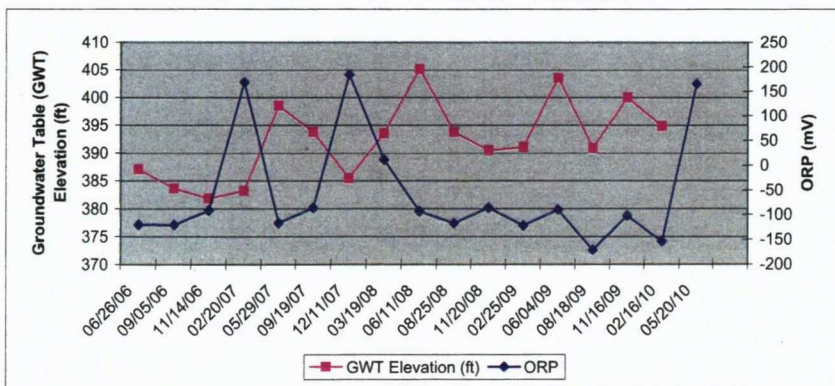
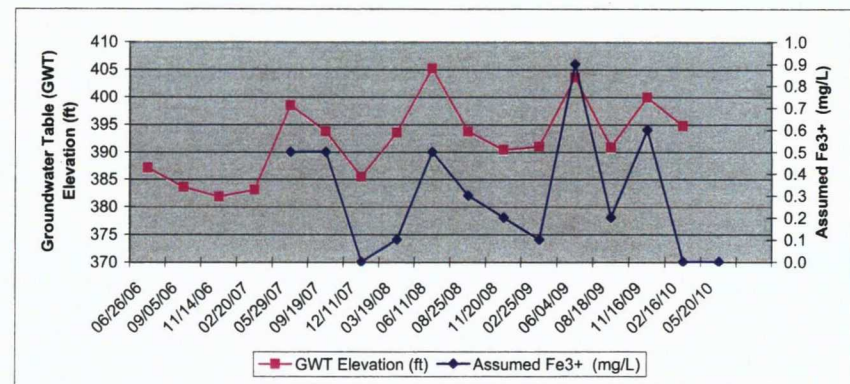
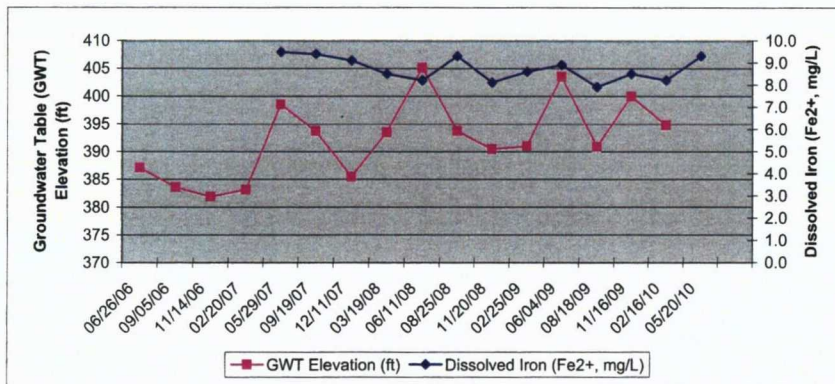
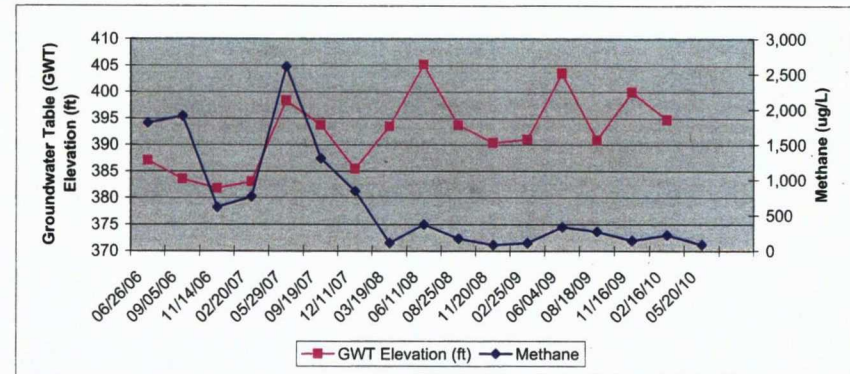
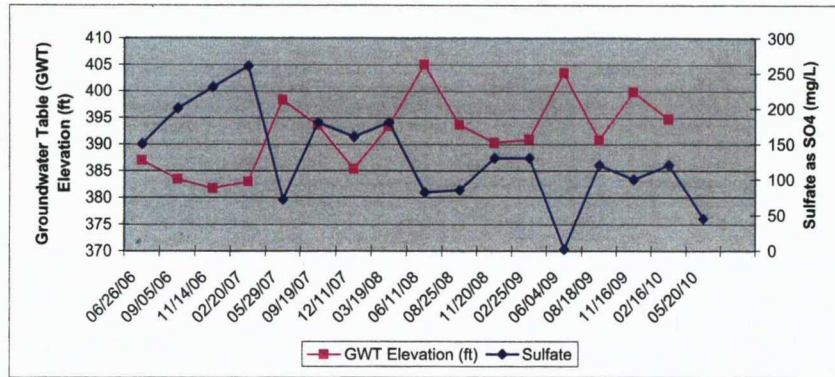


**ATTACHMENT A**  
**Supporting Data for MNA Evaluation 3Q08 through 2Q10**  
**Comparison of COI and MNA Parameters to Groundwater Levels over Time**  
**Monitoring Well BSA-MW-4**



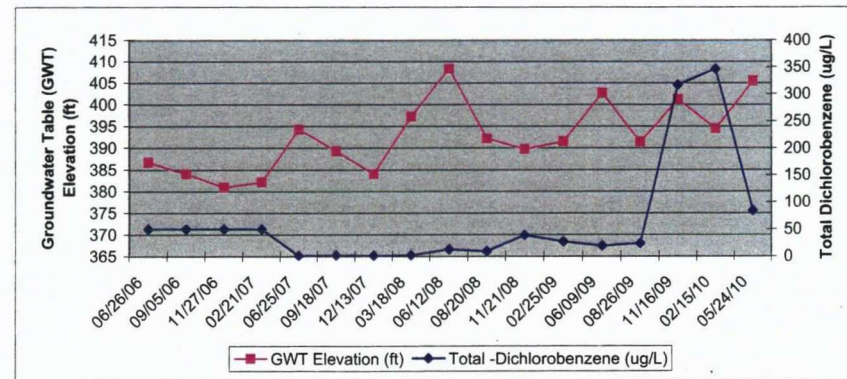
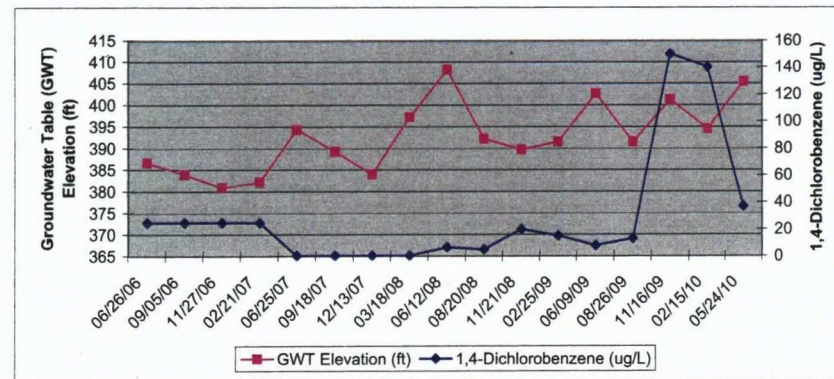
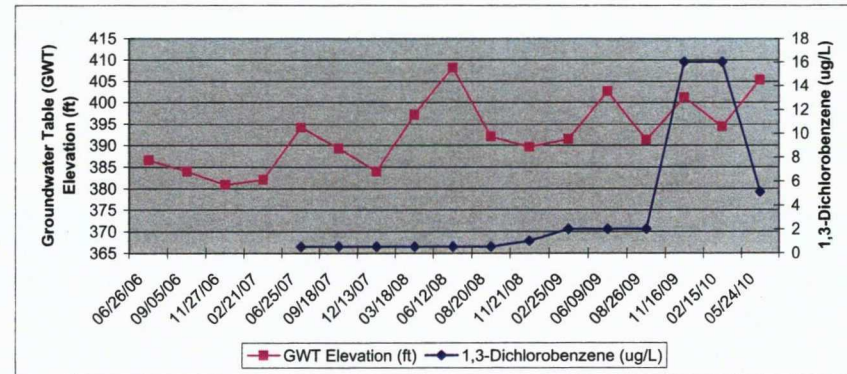
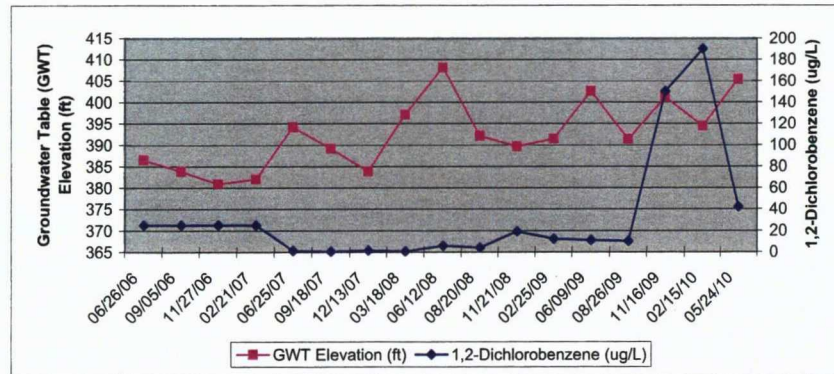
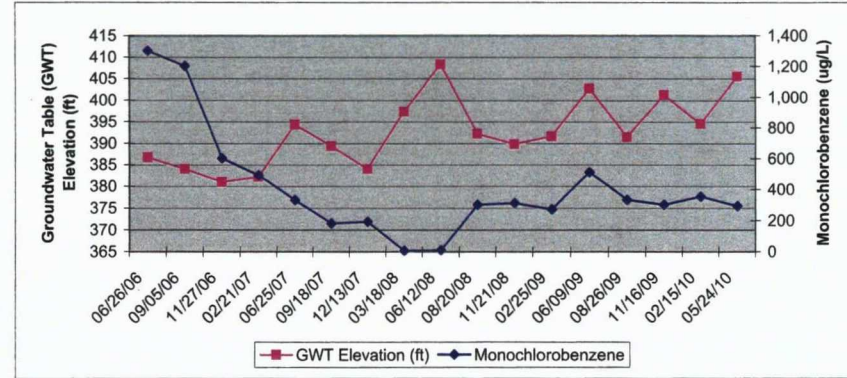
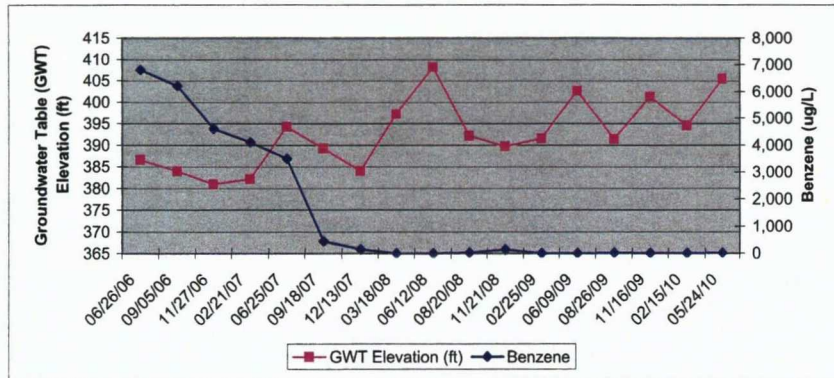


**ATTACHMENT A**  
**Supporting Data for MNA Evaluation 3Q08 through 2Q10**  
**Comparison of COI and MNA Parameters to Groundwater Levels over Time**  
**Monitoring Well BSA-MW-4**



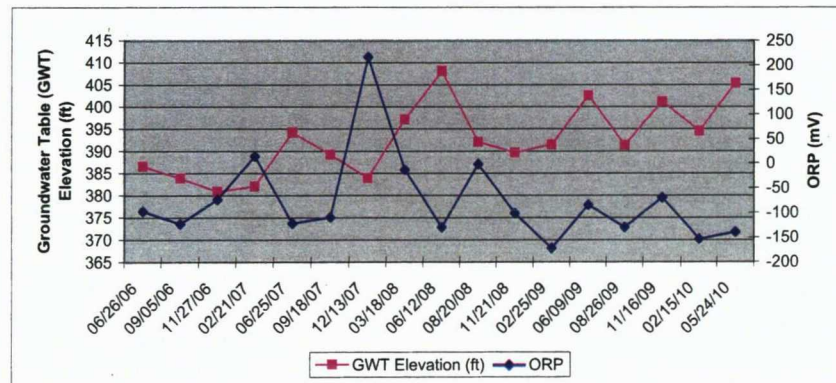
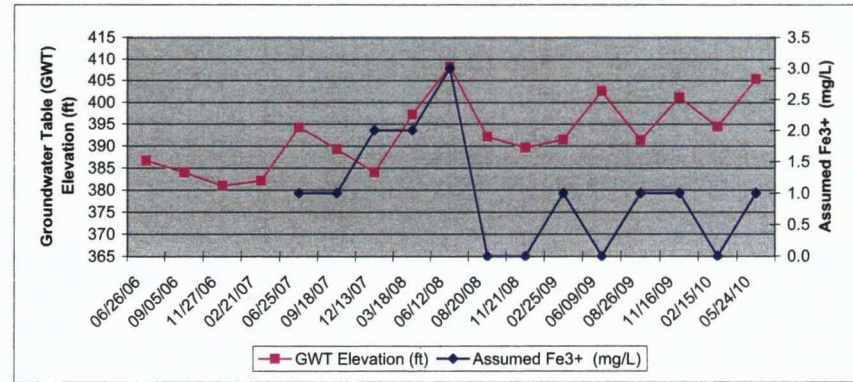
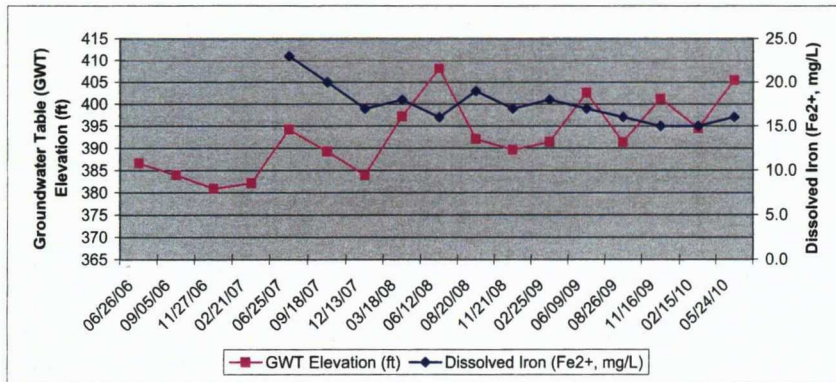
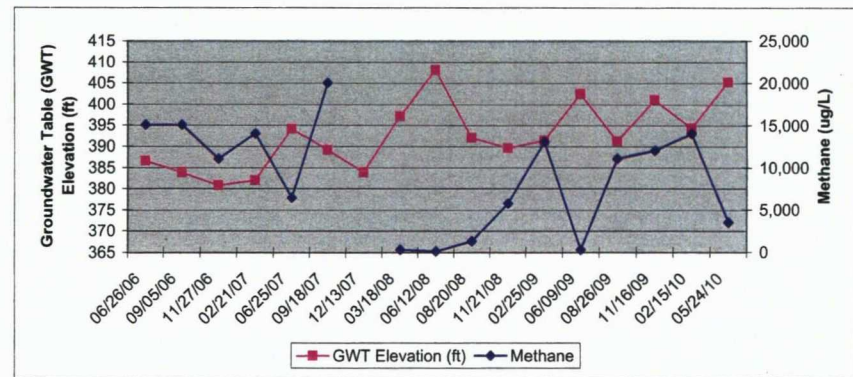
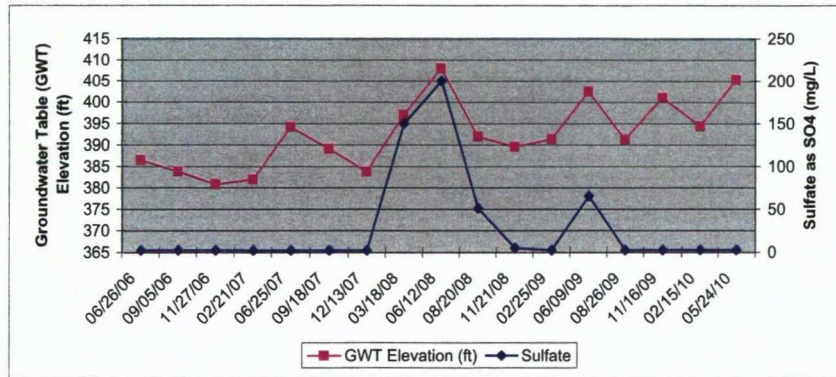


**ATTACHMENT A**  
**Supporting Data for MNA Evaluation 3Q08 through 2Q10**  
**Comparison of COI and MNA Parameters to Groundwater Levels over Time**  
**Monitoring Well BSA-MW-5**



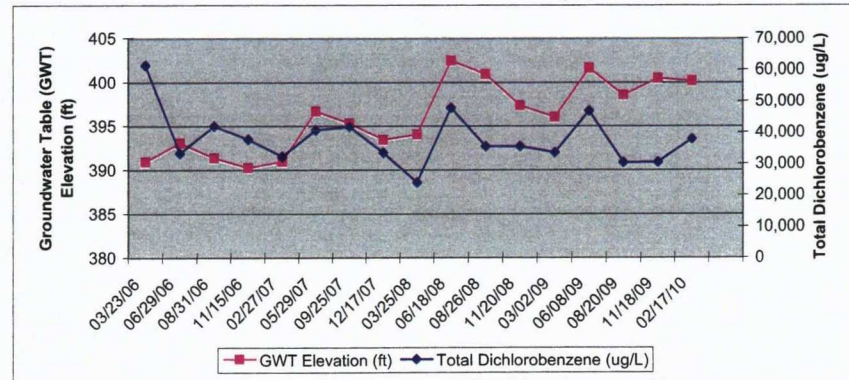
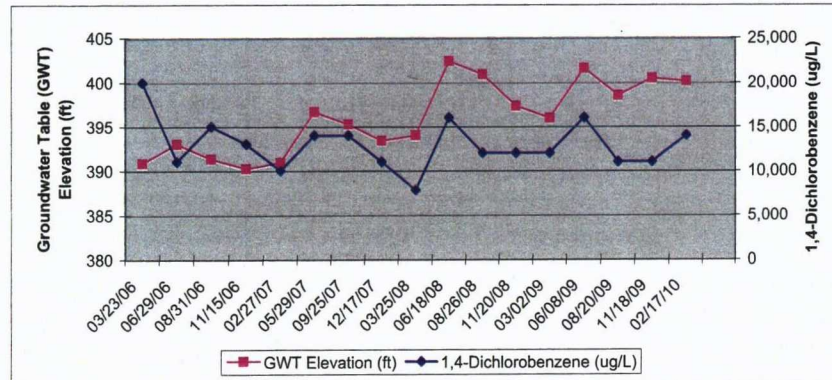
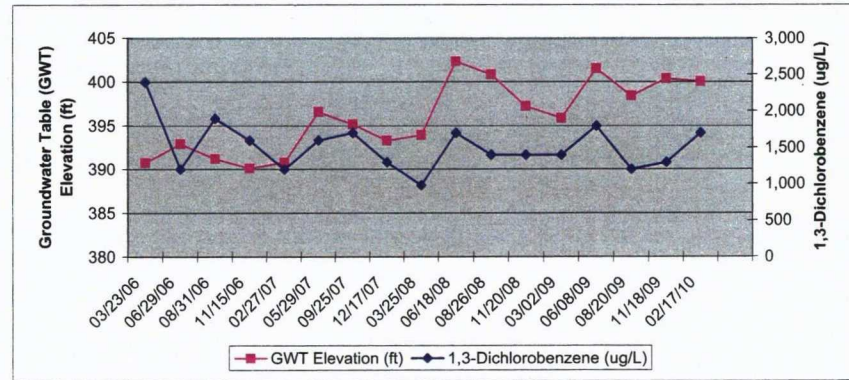
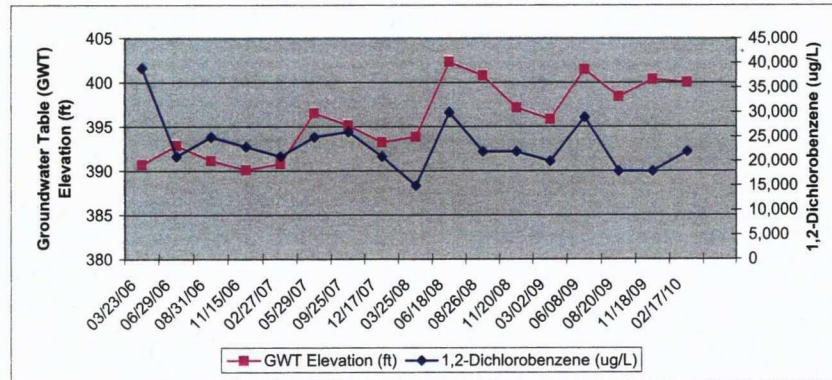
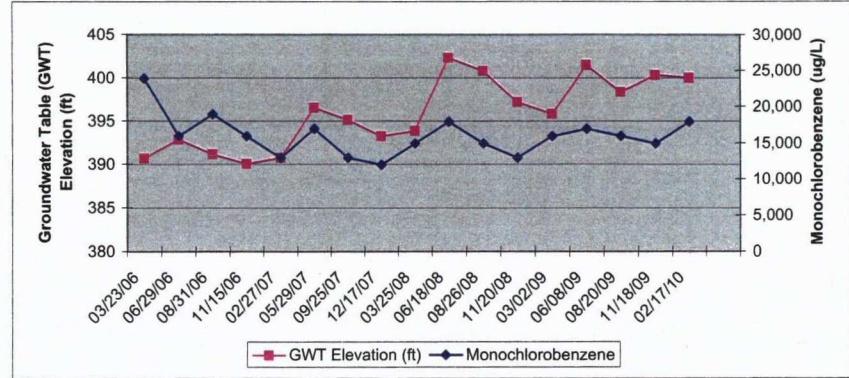
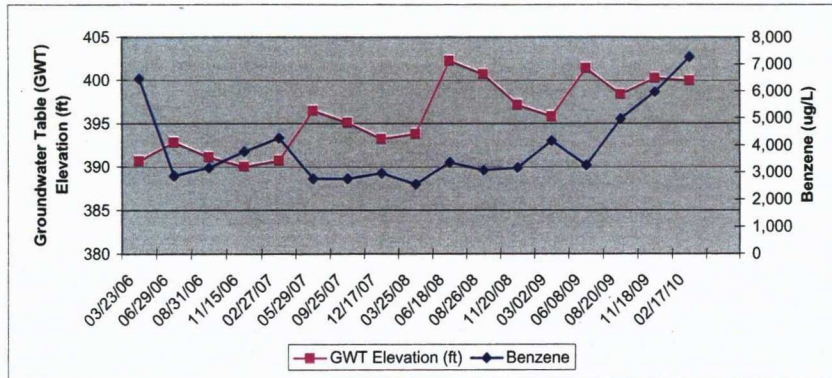


**ATTACHMENT A**  
**Supporting Data for MNA Evaluation 3Q08 through 2Q10**  
**Comparison of COI and MNA Parameters to Groundwater Levels over Time**  
**Monitoring Well BSA-MW-5**



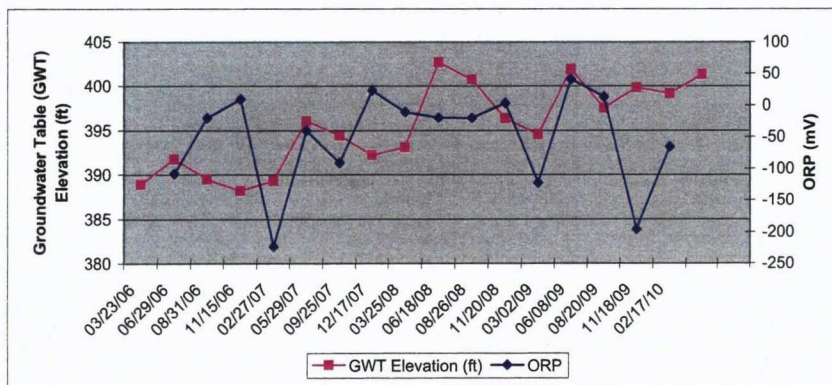
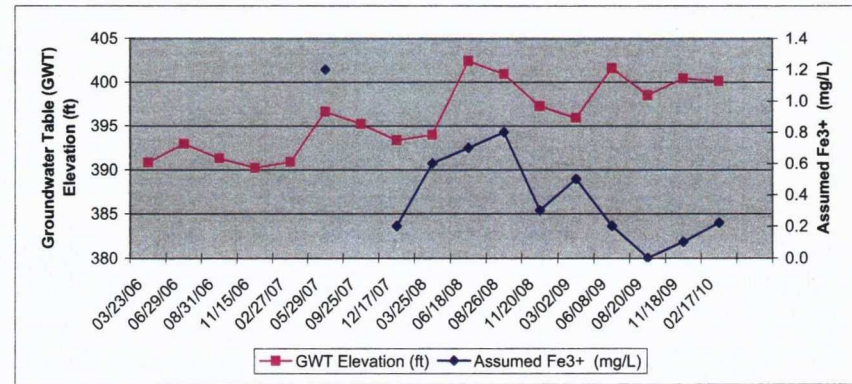
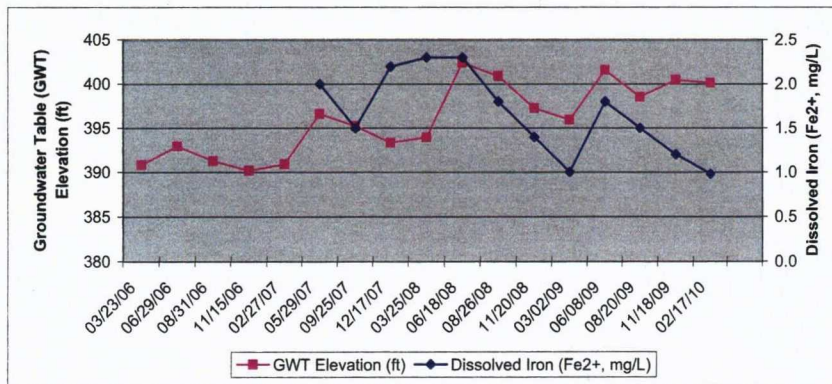
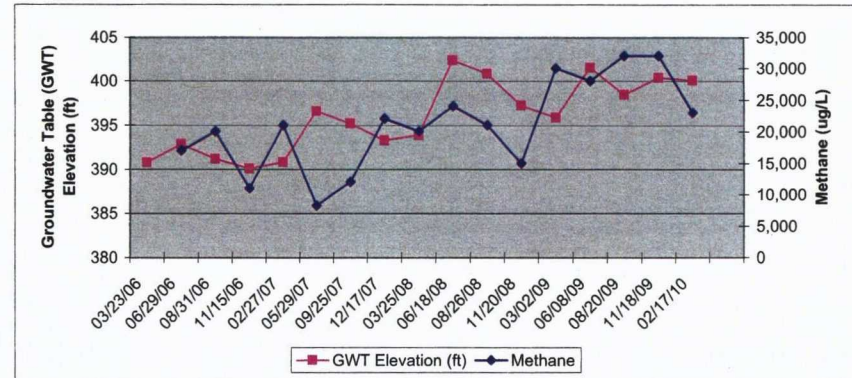
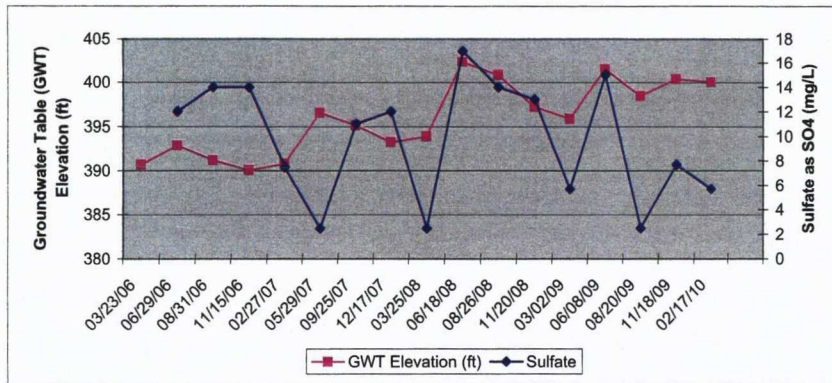


**ATTACHMENT A**  
**Supporting Data for MNA Evaluation 3Q08 through 2Q10**  
**Comparison of COI and MNA Parameters to Groundwater Levels over Time**  
**Monitoring Well CPA-MW-1**



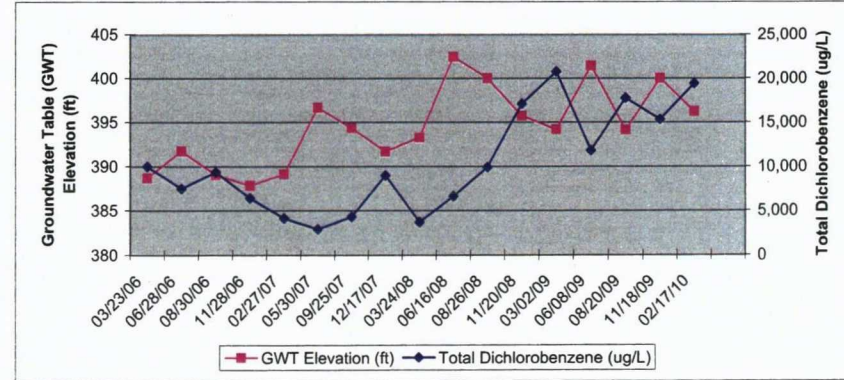
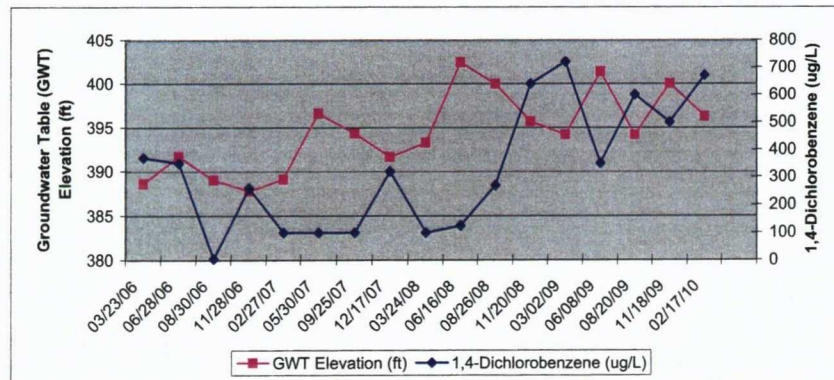
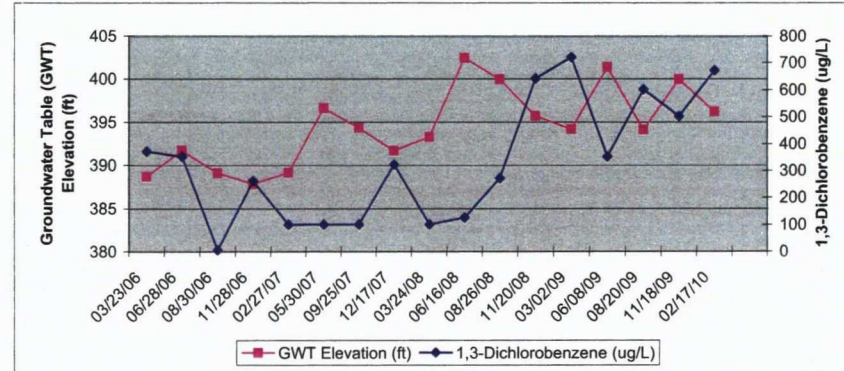
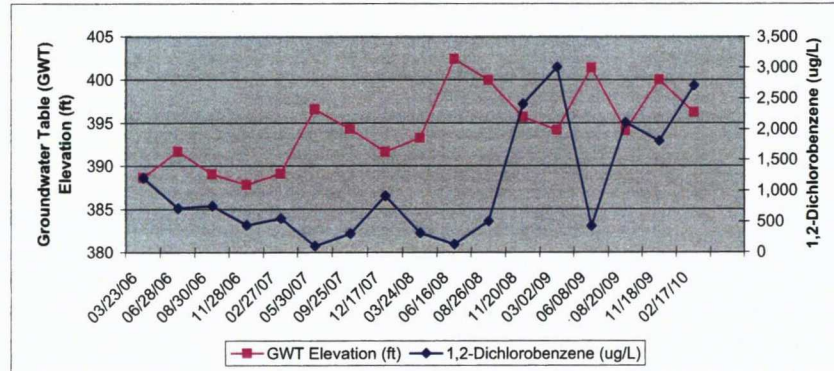
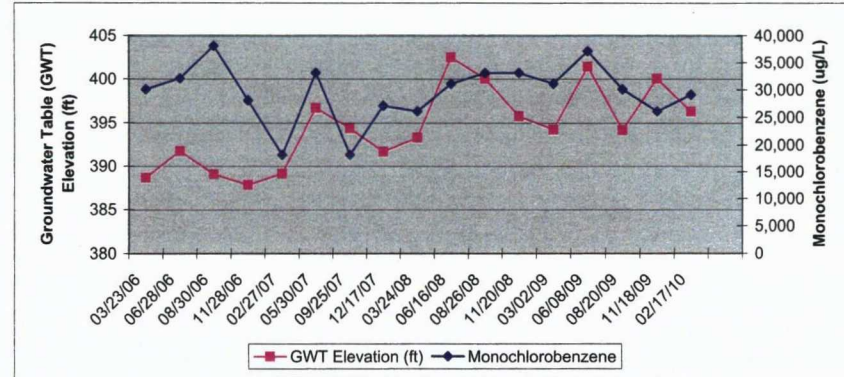
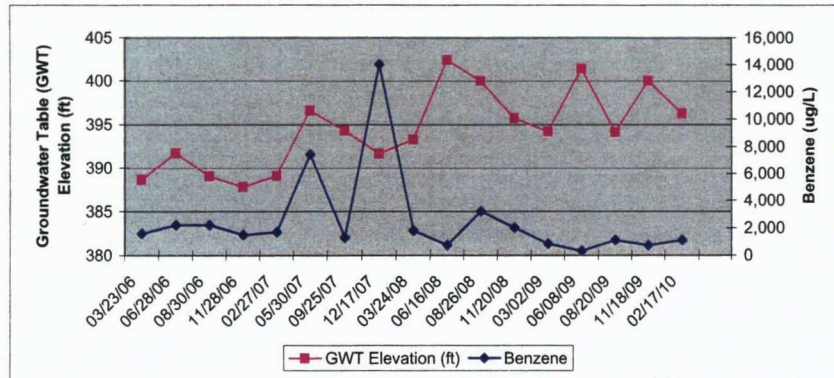


**ATTACHMENT A**  
**Supporting Data for MNA Evaluation 3Q08 through 2Q10**  
**Comparison of COI and MNA Parameters to Groundwater Levels over Time**  
**Monitoring Well CPA-MW-1**



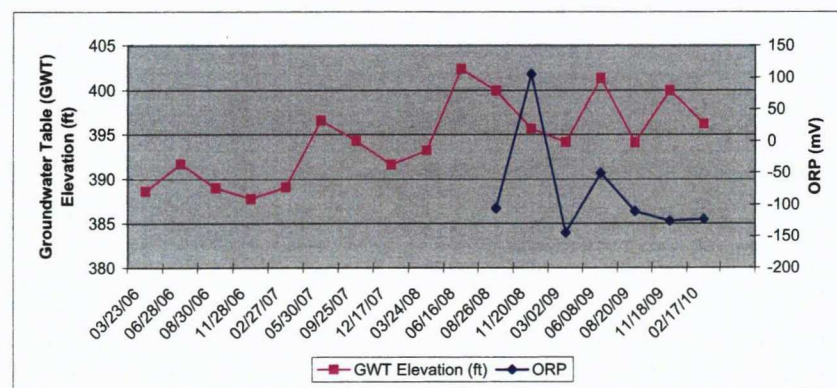
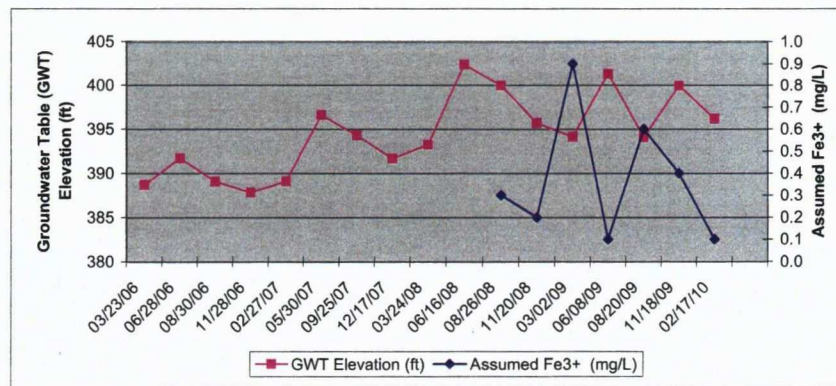
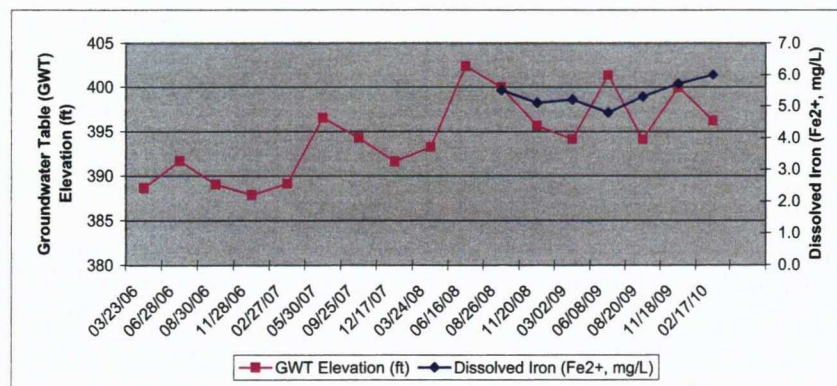
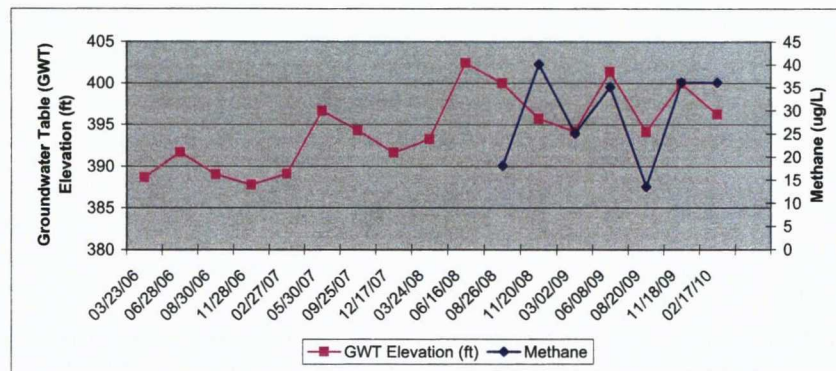
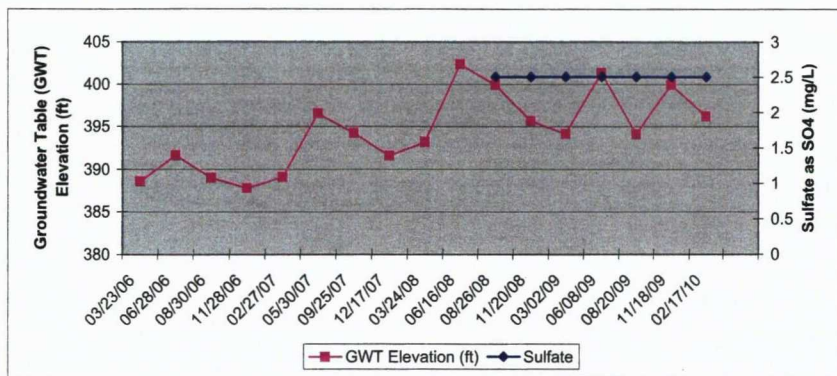


**ATTACHMENT A**  
**Supporting Data for MNA Evaluation 3Q08 through 2Q10**  
**Comparison of COI and MNA Parameters to Groundwater Levels over Time**  
**Monitoring Well CPA-MW-2**



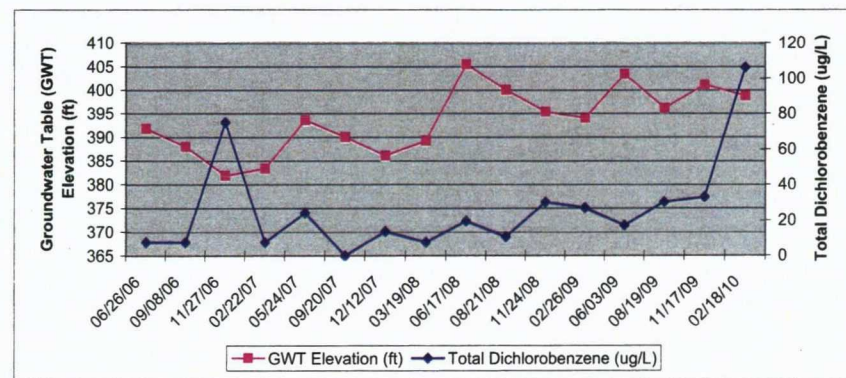
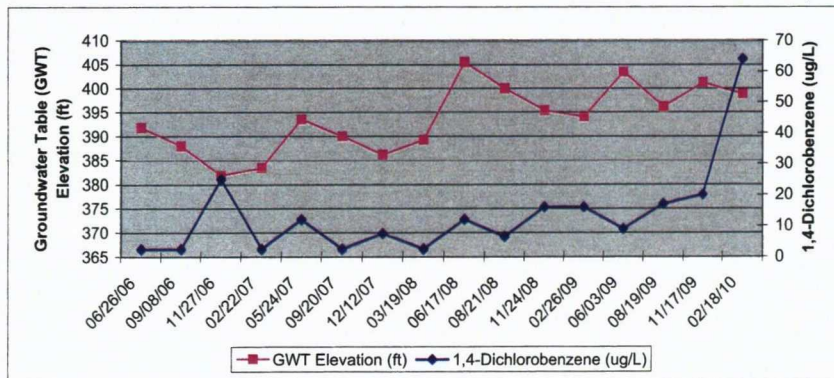
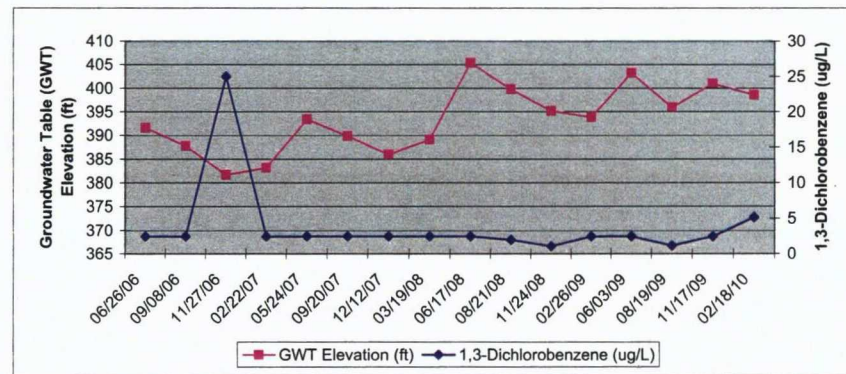
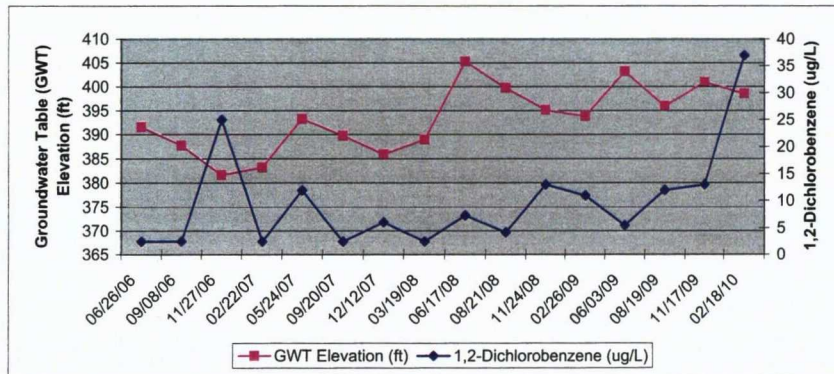
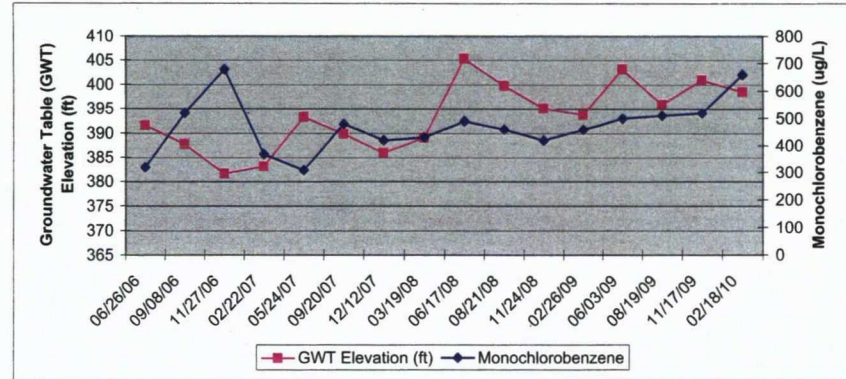
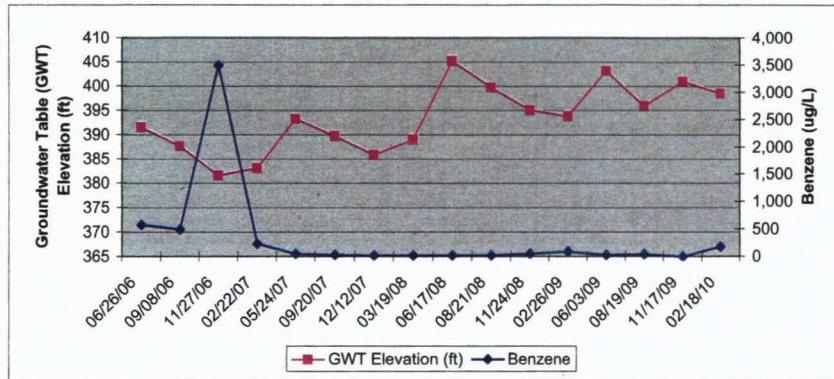


**ATTACHMENT A**  
**Supporting Data for MNA Evaluation 3Q08 through 2Q10**  
**Comparison of COI and MNA Parameters to Groundwater Levels over Time**  
**Monitoring Well CPA-MW-2**



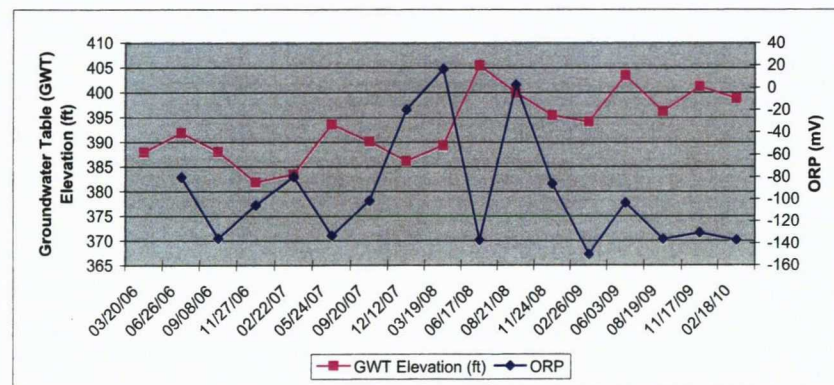
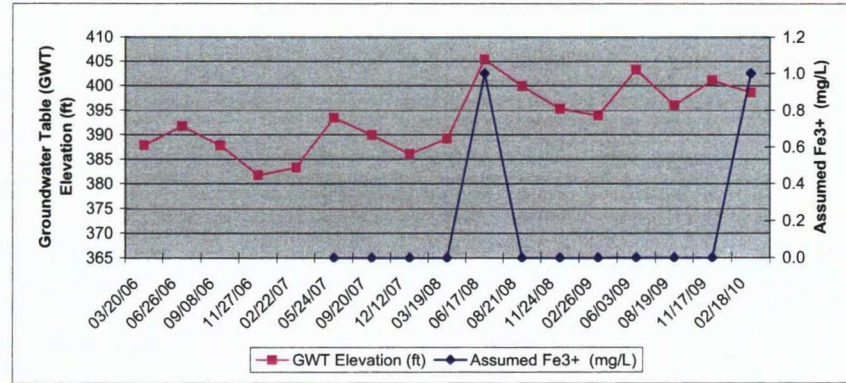
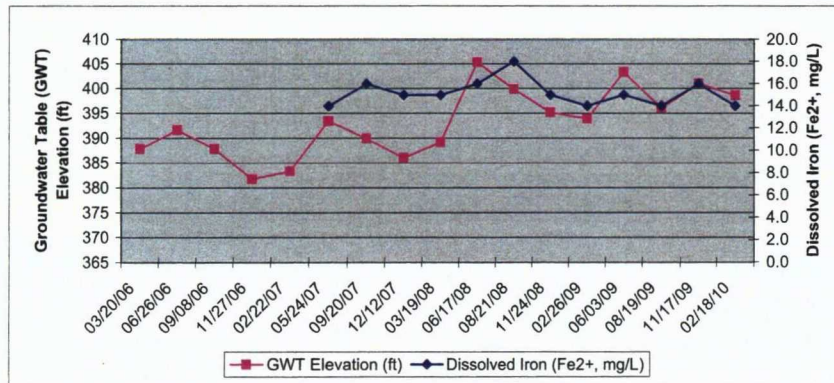
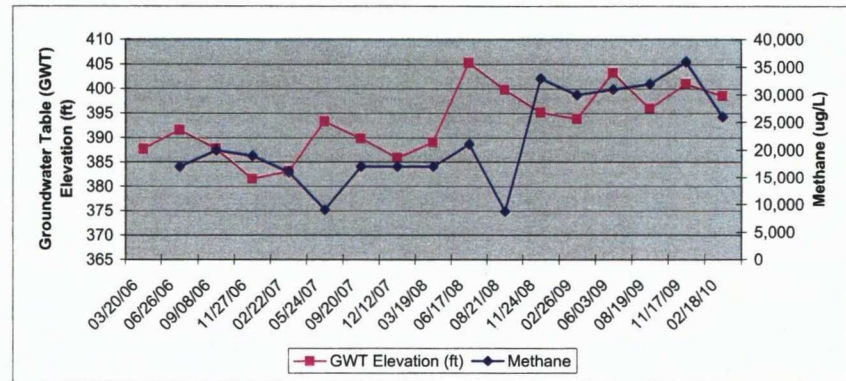
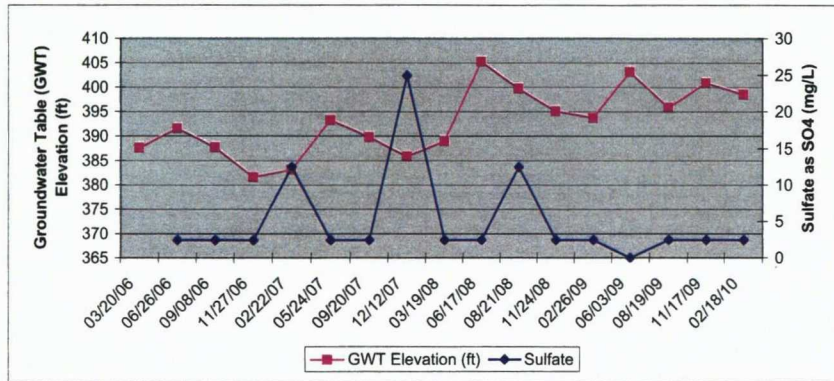


**ATTACHMENT A**  
**Supporting Data for MNA Evaluation 3Q08 through 2Q10**  
**Comparison of COI and MNA Parameters to Groundwater Levels over Time**  
**Monitoring Well CPA-MW-3**



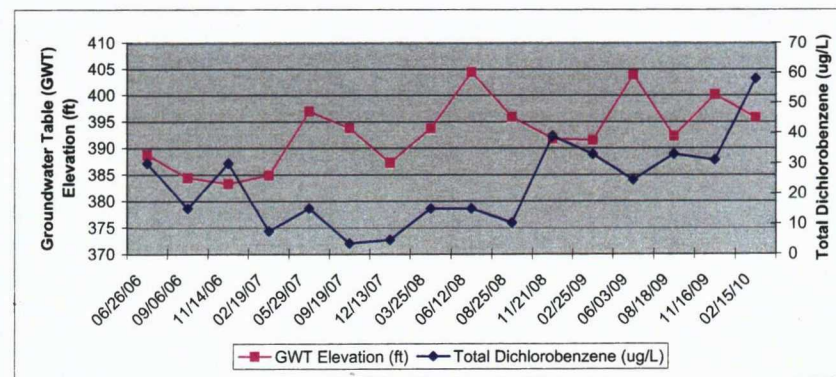
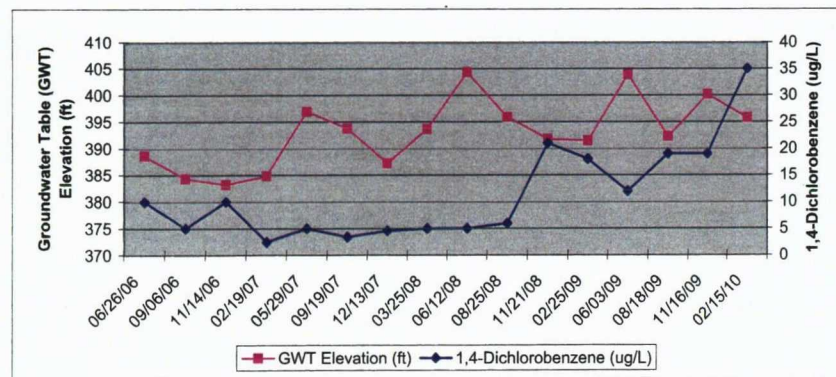
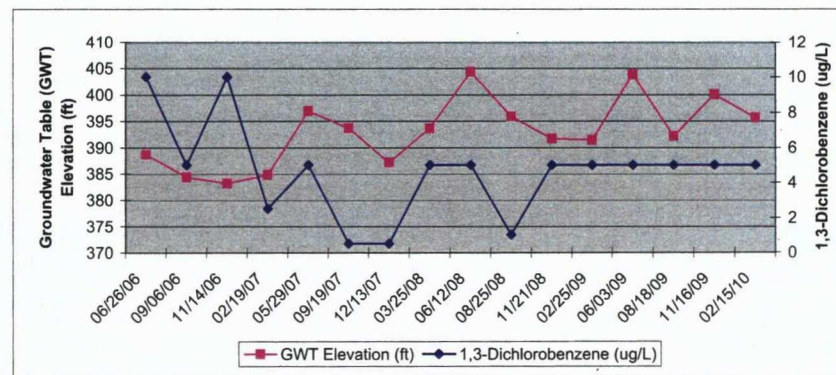
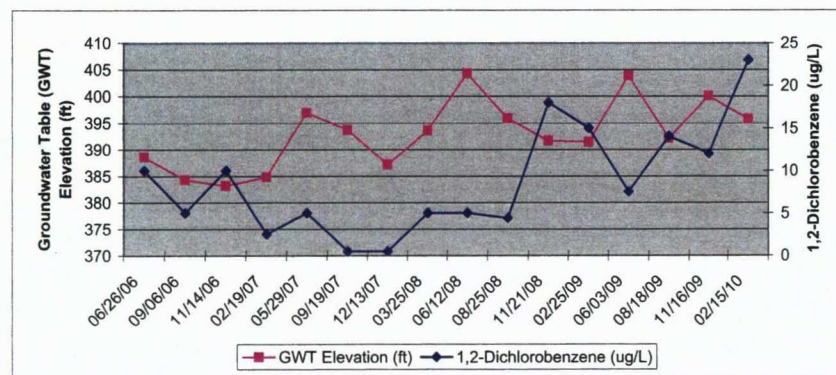
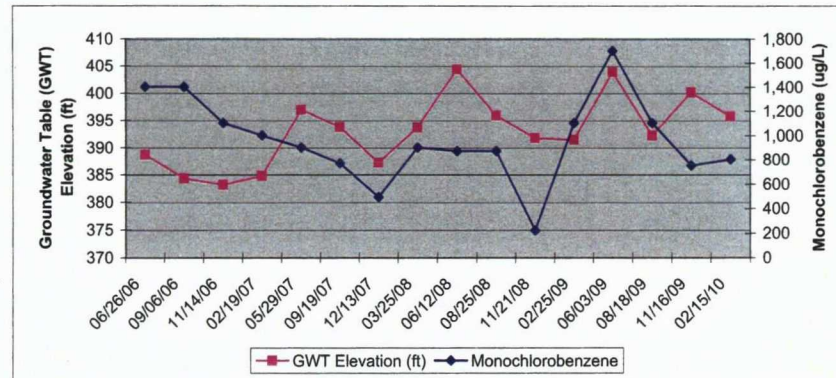
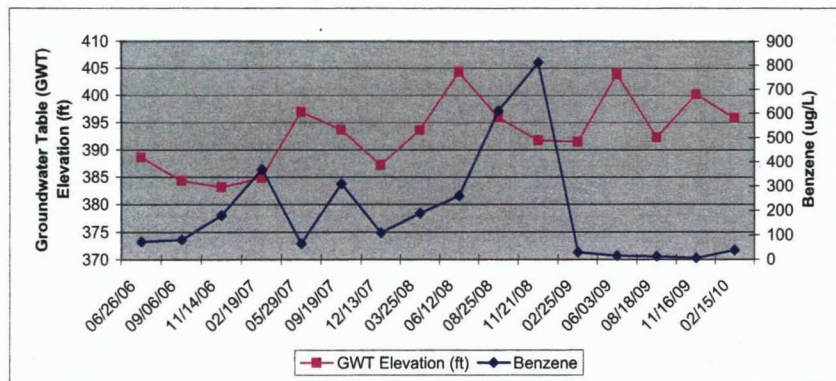


**ATTACHMENT A**  
**Supporting Data for MNA Evaluation 3Q08 through 2Q10**  
**Comparison of COI and MNA Parameters to Groundwater Levels over Time**  
**Monitoring Well CPA-MW-3**



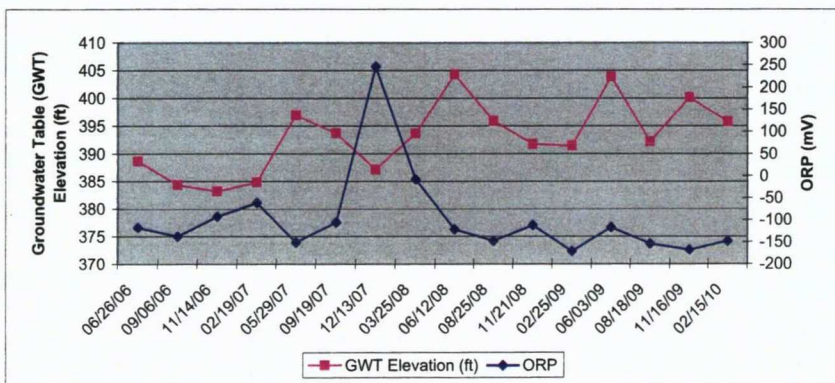
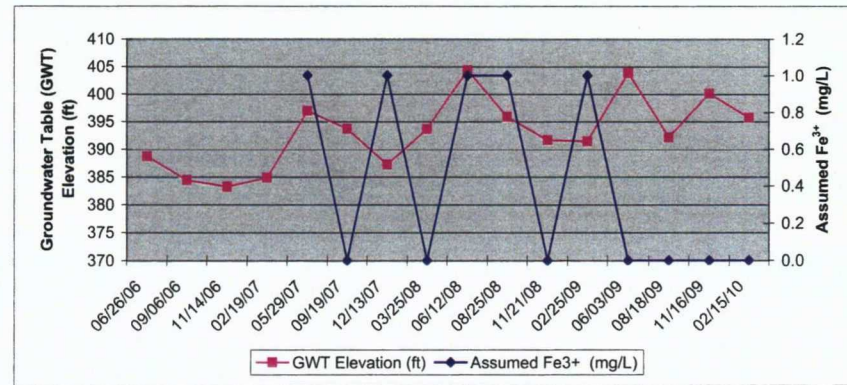
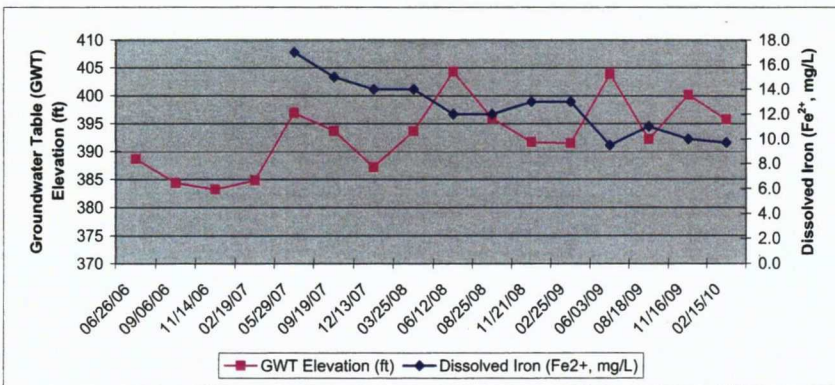
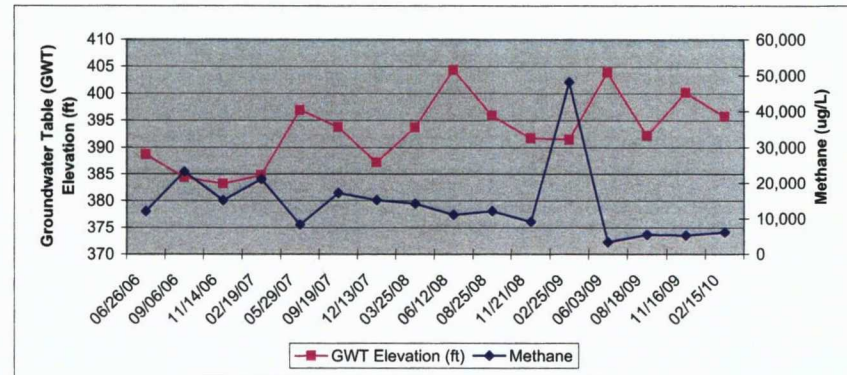
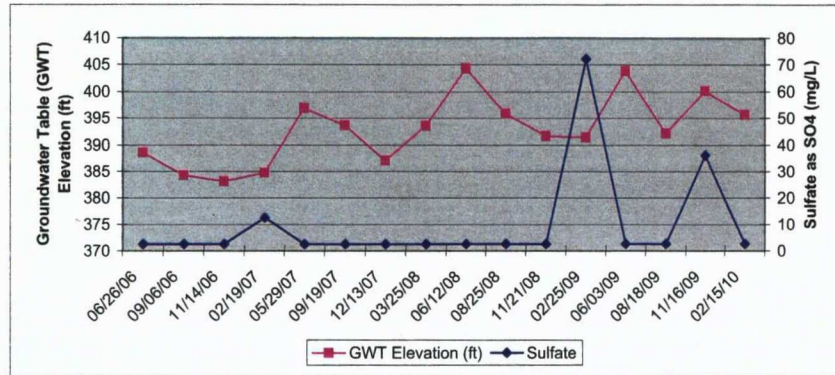


**ATTACHMENT A**  
**Supporting Data for MNA Evaluation 3Q08 through 2Q10**  
**Comparison of COI and MNA Parameters to Groundwater Levels over Time**  
**Monitoring Well CPA-MW-4**



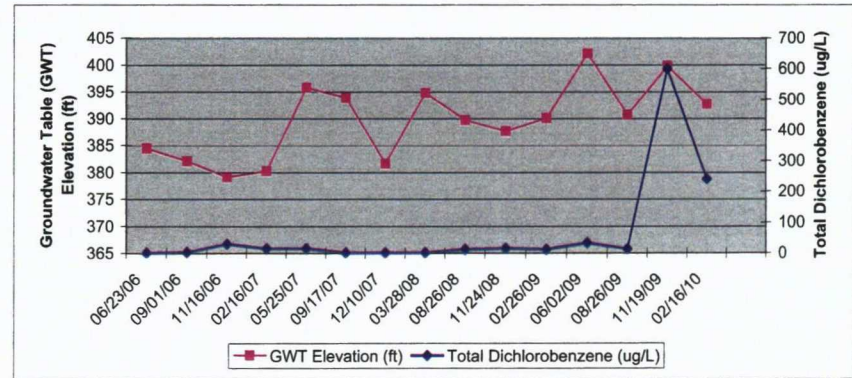
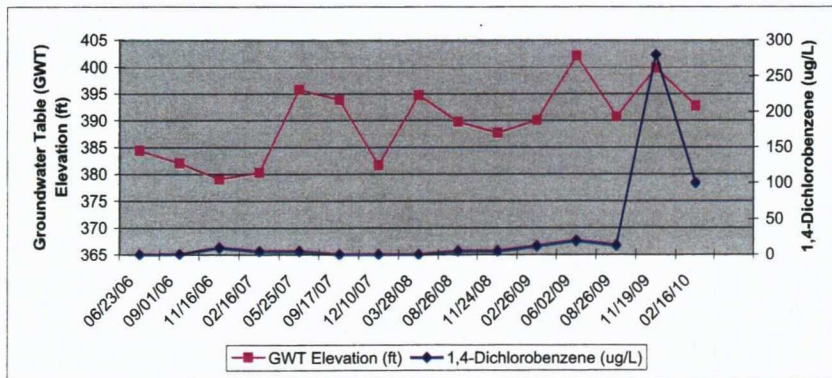
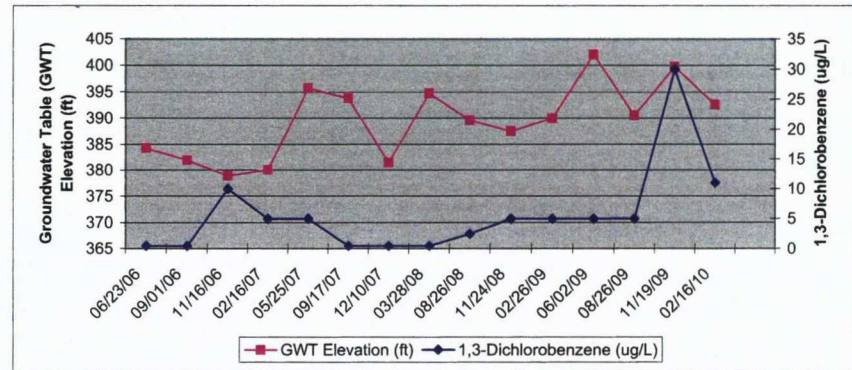
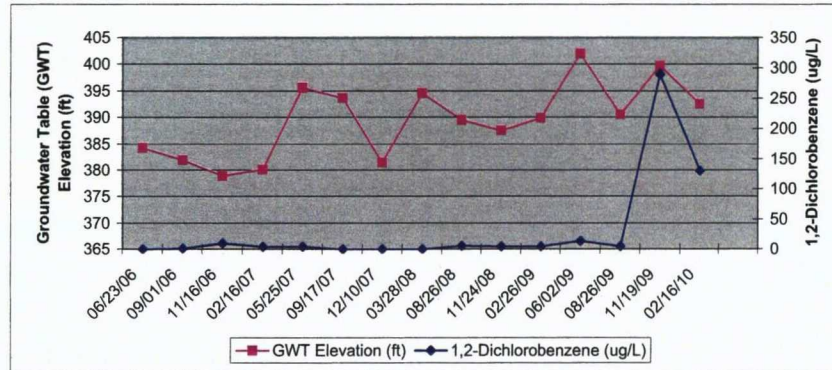
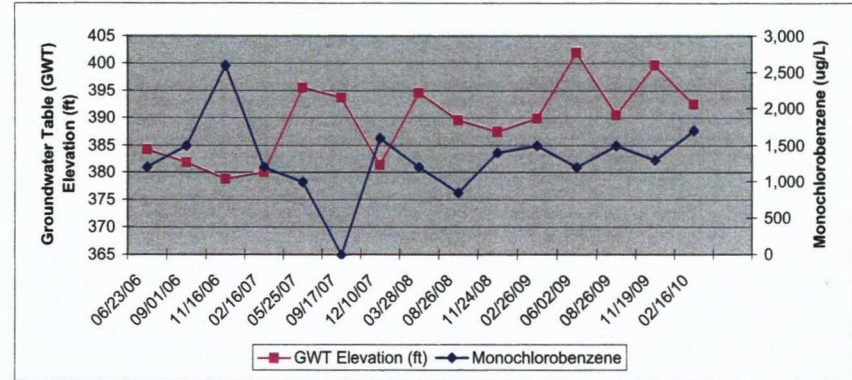
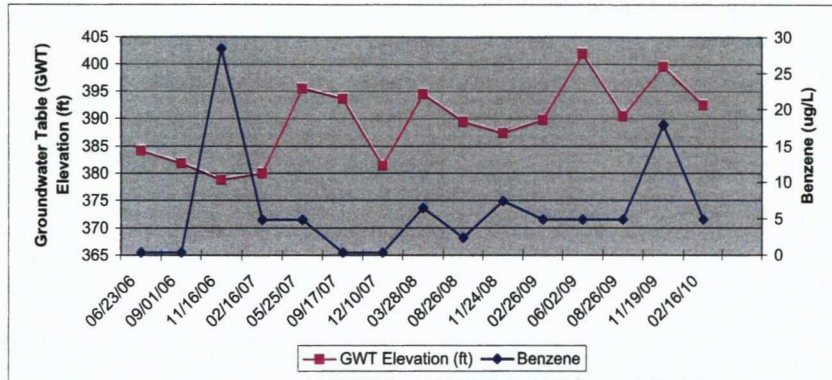


**ATTACHMENT A**  
**Supporting Data for MNA Evaluation 3Q08 through 2Q10**  
**Comparison of COI and MNA Parameters to Groundwater Levels over Time**  
**Monitoring Well CPA-MW-4**



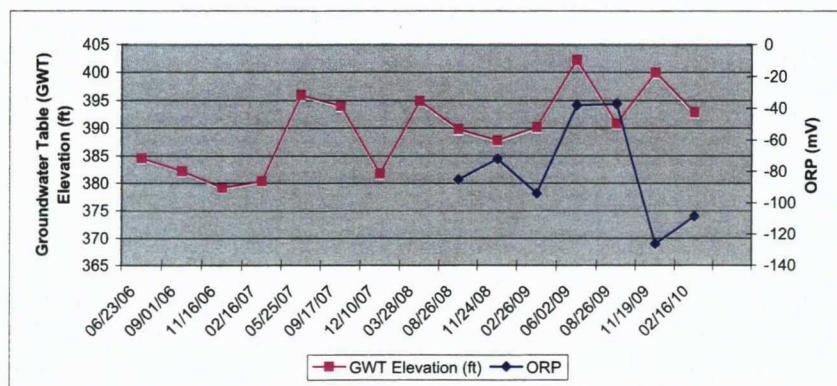
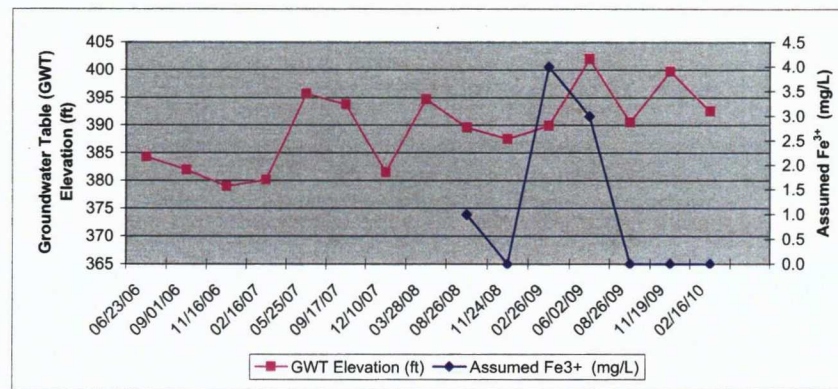
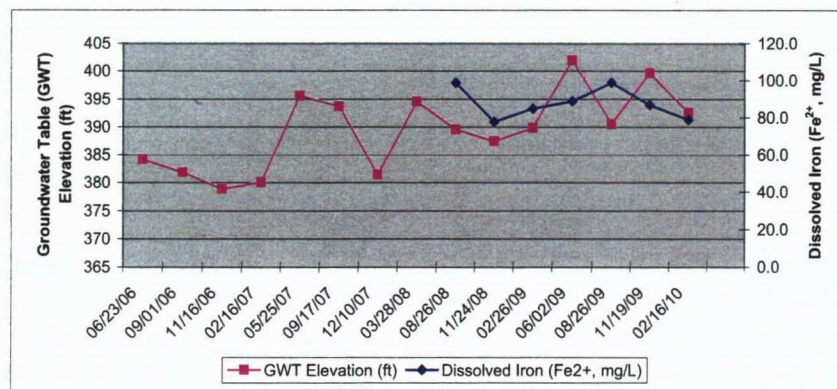
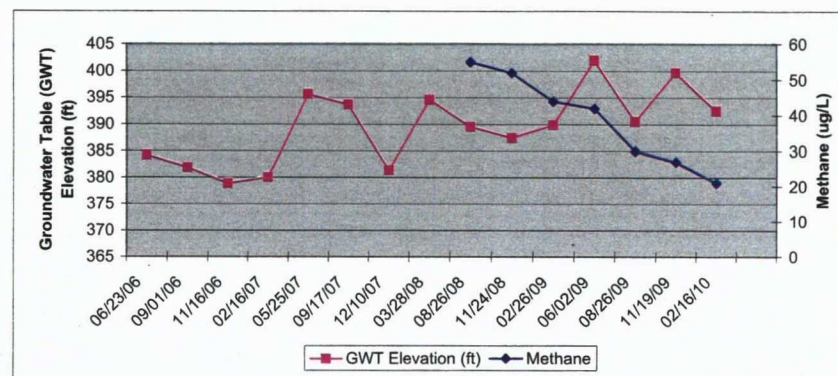
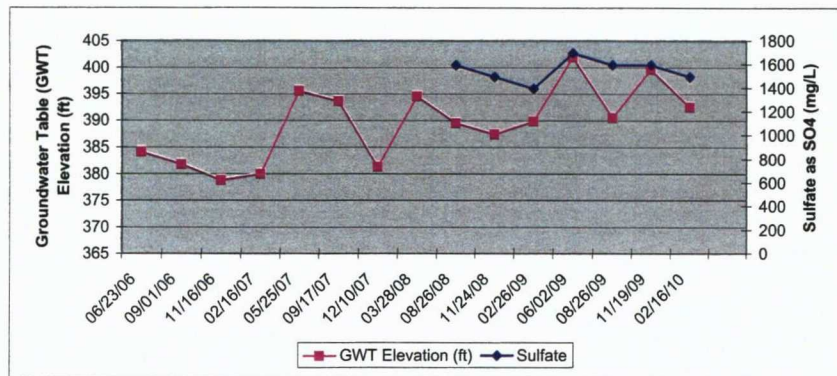


**ATTACHMENT A**  
**Supporting Data for MNA Evaluation 3Q08 through 2Q10**  
**Comparison of COI and MNA Parameters to Groundwater Levels over Time**  
**Monitoring Well CPA-MW-5**





**ATTACHMENT A**  
**Supporting Data for MNA Evaluation 3Q08 through 2Q10**  
**Comparison of COI and MNA Parameters to Groundwater Levels over Time**  
**Monitoring Well CPA-MW-5**





ATTACHMENT A  
Supporting Data for MNA Evalaution 3Q08 through 2Q10

| Location | Point ID | Quarterly Effort | Sample ID    | Sample Date | Water Level (Depth, ft.) | Groundwater Eelvation (feet) | Benzene (ug/L) | Monochlorobenzene (ug/L) | 1,2-Dichlorobenzene (ug/L) | 1,3-Dichlorobenzene (ug/L) | 1,4-Dichlorobenzene (ug/L) | Total Dichlorobenzene (ug/L) | 1,2,4-Trichlorobenzene (ug/L) | Nitrogen, Nitrate (mg/L) | Sulfate as SO4 (mg/L) | Alkalinity (mg/L) | Carbon Dioxide (mg/L) | Methane (ug/L) | Dissolved Oxygen (mg/L) | ORP (mV) | Total Iron (mg/L) | Dissolved Iron (Fe <sup>2+</sup> , mg/L) | Total Iron - Fe <sup>2+</sup> (mg/L) Assumed to be Fe <sup>3+</sup> |
|----------|----------|------------------|--------------|-------------|--------------------------|------------------------------|----------------|--------------------------|----------------------------|----------------------------|----------------------------|------------------------------|-------------------------------|--------------------------|-----------------------|-------------------|-----------------------|----------------|-------------------------|----------|-------------------|--|---|
| CPAMW04  | PS11     | 2006 2nd Quarter | PSMW11-0606  | 6/26/2006   | 32.57                    | 388.63                       | 73             | 1,400                    | 10                         | 10                         | 10                         | 30                           | 4.7                           | 0.025                    | 2.5                   | 860               | 76                    | 12,000         | 0.22                    | -117.4   |                   |  |   |
| CPAMW04  | PS11     | 2006 3rd Quarter | PSMW11-0906  | 9/6/2006    | 36.88                    | 384.32                       | 82             | 1,400                    | 5                          | 5                          | 5                          | 15                           | 4.75                          | 0.057                    | 2.5                   | 800               | 75                    | 23,000         | 0.58                    | -137.9   |                   |  |   |
| CPAMW04  | PS11     | 2006 4th Quarter | PSMW11-1106  | 11/14/2006  | 38.02                    | 383.18                       | 180            | 1,100                    | 10                         | 10                         | 10                         | 30                           | 4.7                           | 0.025                    | 2.5                   | 770               | 130                   | 15,000         | 0.98                    | -92.3    |                   |  |   |
| CPAMW04  | PS11     | 2007 1st Quarter | PSMW11-0207  | 2/19/2007   | 36.40                    | 384.80                       | 370            | 1,000                    | 3                          | 3                          | 3                          | 8                            | 4.9                           | 0.08                     | 12.5                  | 790               | 37                    | 21,000         | 0.48                    | -60.8    |                   |  |   |
| CPAMW04  | PS11     | 2007 2nd Quarter | PSMW11-0507  | 5/29/2007   | 24.31                    | 396.89                       | 65             | 900                      | 5                          | 5                          | 5                          | 15                           | 5                             | 0.025                    | 2.5                   | 800               | 50                    | 8,200          | 0.86                    | -150.9   | 18.0              | 17.0                                     | 1.0   |
| CPAMW04  | PS11     | 2007 3rd Quarter | PSMW11-0907  | 9/19/2007   | 27.53                    | 393.67                       | 310            | 770                      | 1                          | 1                          | 3                          | 3                            | 4.7                           | 0.025                    | 2.5                   | 790               | 40                    | 17,000         | 0.24                    | -105.6   | 14.0              | 15.0                                     | 0.0   |
| CPAMW04  | PS11     | 2007 4th Quarter | PSMW11-1207  | 12/13/2007  | 34.07                    | 387.13                       | 110            | 490                      | 1                          | 1                          | 5                          | 5                            | 4.7                           | 0.025                    | 2.5                   | 800               | 27                    | 15,000         | 0.46                    | 246.1    | 15.0              | 14.0                                     | 1.0   |
| CPAMW04  | PS11     | 2008 1st Quarter | PSMW11-0308  | 3/25/2008   | 27.60                    | 393.60                       | 190            | 900                      | 5                          | 5                          | 5                          | 15                           | 4.8                           | 0.025                    | 2.5                   | 790               | 60                    | 14,000         | 85.6                    | -8.4     | 14.0              | 14.0                                     | 0.0   |
| CPAMW04  | PS11     | 2008 2nd Quarter | PSMW11-0608  | 6/12/2008   | 16.93                    | 404.27                       | 260            | 870                      | 5                          | 5                          | 5                          | 15                           | 4.7                           | 0.025                    | 2.5                   | 810               | 40                    | 11,000         | 0.32                    | -121.8   | 13.0              | 12.0                                     | 1.0   |
| CPAMW04  | PS11     | 2008 3rd Quarter |              | 8/25/2008   | 25.37                    | 395.83                       | 610            | 870                      | 4                          | 1                          | 6                          | 10                           |                               | 0.025                    | 2.5                   | 830               | 27                    | 12,000         | 0.63                    | -147.7   | 13.0              | 12.0                                     | 1.0   |
| CPAMW04  | PS11     | 2008 4th Quarter |              | 11/21/2008  | 29.55                    | 391.65                       | 810            | 220                      | 18                         | 5                          | 21                         | 39                           |                               | 0.025                    | 2.5                   | 770               | 15                    | 9,000          | 6.39                    | -112.2   | 13.0              | 13.0                                     | 0.0   |
| CPAMW04  | PS11     | 2009 1st Quarter |              | 2/25/2009   | 29.80                    | 391.40                       | 30             | 1,100                    | 15                         | 5                          | 18                         | 33                           | 4.85                          | 0.025                    | 72                    | 810               | 23                    | 48,000         | 4.95                    | -171.6   | 14.0              | 13.0                                     | 1.0   |
| CPAMW04  | PS11     | 2009 2nd Quarter |              | 6/3/2009    | 17.37                    | 403.83                       | 15             | 1,700                    | 8                          | 5                          | 12                         | 25                           |                               | 0.19                     | 2.5                   | 850               | 40                    | 3,200          | 0.73                    | -117     | 9.5               | 9.5                                      | 0.0   |
| CPAMW04  | PS11     | 2009 3rd Quarter |              | 8/18/2009   | 29.06                    | 392.14                       | 12             | 1,100                    | 14                         | 5                          | 19                         | 33                           | 4.7                           | 0.025                    | 2.5                   | 850               | 50                    | 5300           | 0.83                    | -154.7   | 11.0              | 11.0                                     | 0.0   |
| CPAMW04  | PS12     | 2009 4th Quarter |              | 11/16/2009  | 21.12                    | 400.08                       | 5              | 750                      | 12                         | 5                          | 19                         | 31                           |                               | 0.025                    | 36                    | 770               | 61                    | 5100           | 1.4                     | -168.4   | 10.0              | 10.0                                     | 0.0   |
| CPAMW04  | PS13     | 2010 1st Quarter |              | 2/15/2010   | 25.50                    | 395.70                       | 37             | 800                      | 23                         | 5                          | 35                         | 58                           | 4.7                           | 0.025                    | 2.5                   | 810               | 43                    | 6000           | 0.2                     | -148.4   | 9.3               | 9.7                                      | 0.0   |
| CPAMW05  | PS14D    | 2006 2nd Quarter | PSMW14D-0606 | 6/23/2006   | 28.83                    | 384.32                       | 1              | 1,200                    | 1                          | 1                          | 1                          | 2                            | 4.7                           |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW05  | PS14D    | 2006 3rd Quarter | PSMW14D-0906 | 9/1/2006    | 31.17                    | 381.98                       | 1              | 1,500                    | 2                          | 1                          | 1                          | 3                            | 4.7                           |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW05  | PS14D    | 2006 4th Quarter | PSMW14D-1106 | 11/16/2006  | 34.17                    | 378.98                       | 29             | 2,600                    | 10                         | 10                         | 10                         | 30                           | 4.85                          |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW05  | PS14D    | 2007 1st Quarter | PSMW14D-0207 | 2/16/2007   | 32.98                    | 380.17                       | 5              | 1,200                    | 5                          | 5                          | 5                          | 15                           | 4.7                           |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW05  | PS14D    | 2007 2nd Quarter | PSMW14D-0507 | 5/25/2007   | 17.43                    | 395.72                       | 5              | 1,000                    | 5                          | 5                          | 5                          | 15                           | 4.7                           |                          |                       |                   |                       |                |                         |          | 100.0             |  |   |
| CPAMW05  | PS14D    | 2007 3rd Quarter | PSMW14D-0907 | 9/17/2007   | 19.35                    | 393.80                       | 1              | 1                        | 1                          | 1                          | 1                          | 2                            | 4.7                           |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW05  | PS14D    | 2007 4th Quarter | PSMW14D-1207 | 12/10/2007  | 31.64                    | 381.51                       | 1              | 1,600                    | 1                          | 1                          | 1                          | 2                            | 4.8                           |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW05  | PS14D    | 2008 1st Quarter | PSMW14D-0308 | 3/28/2008   | 18.44                    | 394.71                       | 7              | 1,200                    | 1                          | 1                          | 1                          | 2                            | 4.7                           |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW05  | PS14D    | 2008 3rd Quarter |              | 8/26/2008   | 23.54                    | 389.61                       | 2.5            | 850                      | 6                          | 2.5                        | 5                          | 11                           |                               | 0.25                     | 1600                  | 320               | 51                    | 55             | 1.28                    | -85.8    | 100.0             | 99.0                                     | 1.0   |
| CPAMW05  | PS14D    | 2008 4th Quarter |              | 11/24/2008  | 25.60                    | 387.55                       | 8              | 1,400                    | 5                          | 5                          | 5                          | 15                           |                               | 0.025                    | 1500                  | 340               | 110                   | 52             | 6.26                    | -72.7    | 76.0              | 78.0                                     | 0.0   |
| CPAMW05  | PS14D    | 2009 1st Quarter |              | 2/26/2009   | 23.20                    | 389.95                       | 5              | 1,500                    | 5                          | 5                          | 12                         | 12                           |                               | 0.025                    | 1400                  | 280               | 66                    | 44             | 6.37                    | -94.7    | 89.0              | 85.0                                     | 4.0   |
| CPAMW05  | PS14D    | 2009 2nd Quarter |              | 6/2/2009    | 11.05                    | 402.10                       | 5              | 1,200                    | 14                         | 5                          | 19                         | 33                           | 42                            | 4                        | 1700                  | 350               | 190                   | 42             | 0.68                    | -38.7    | 92.0              | 89.0                                     | 3.0   |
| CPAMW05  | PS14D    | 2009 3rd Quarter |              | 8/26/2009   | 22.54                    | 390.61                       | 5              | 1,500                    | 5                          | 5                          | 13                         | 13                           | 4.7                           | 0.125                    | 1600                  | 390               | 150 B                 | 30             | 1.62                    | -38      | 93.0              | 99.0                                     | 0.0   |
| CPAMW05  | PS14D    | 2009 4th Quarter |              | 11/19/2009  | 13.34                    | 399.81                       | 18             | 1,300                    | 290                        | 30                         | 280                        | 600                          | NA                            | 0.025                    | 1600                  | 330               | 110                   | 27             | 6.22                    | -126.9   | 82.0              | 87.0                                     | 0.0   |
| CPAMW05  | PS14D    | 2010 1st Quarter |              | 2/16/2010   | 20.51                    | 392.64                       | 5              | 1,700                    | 130                        | 11                         | 100                        | 241                          | 4.7                           | 0.025                    | 1500                  | 310               | 170                   | 21             | 0.11                    | -109.2   | 78.0              | 79.0                                     | 0.0   |

Notes:  
Results in Red are non-detects, half of detection limit  
Blanks indicate rounds where a sample was not collected or analyzed.



ATTACHMENT A  
Supporting Data for MNA Evalaution 3Q08 through 2Q10

| Location  | Point ID | Quarterly Effort | Sample ID      | Sample Date | Water Level (Depth, ft.) | Groundwater Eelvation (feet) | Benzene (ug/L) | Monochlorobenzene (ug/L) | 1,2-Dichlorobenzene (ug/L) | 1,3-Dichlorobenzene (ug/L) | 1,4-Dichlorobenzene (ug/L) | Total Dichlorobenzene (ug/L) | 1,2,4-Trichlorobenzene (ug/L) | Nitrogen, Nitrate (mg/L) | Sulfate as SO4 (mg/L) | Alkalinity (mg/L) | Carbon Dioxide (mg/L) | Methane (ug/L) | Dissolved Oxygen (mg/L) | ORP (mV) | Total Iron (mg/L) | Dissolved Iron (Fe <sup>2+</sup> , mg/L) | Total Iron - Fe <sup>2+</sup> (mg/L) Assumed to be Fe <sup>3+</sup> |
|---|----------|------------------|----------------|-------------|--------------------------|------------------------------|----------------|--------------------------|----------------------------|----------------------------|----------------------------|------------------------------|-------------------------------|--------------------------|-----------------------|-------------------|-----------------------|----------------|-------------------------|----------|-------------------|--|---|
| Values below Detection Limits (shown in red) are assumed to be at half the detection limit. |          |                  |                |             |                          |                              |                |                          |                            |                            |                            |                              |                               |                          |                       |                   |                       |                |                         |          |                   |  |   |
| BSAMW01   | PS05     | 2006 1st Quarter | PSMW5-0306     | 3/23/2006   | 23.44                    | 388.87                       | 490,000        | 2,500                    | 2,500                      | 2,500                      | 2,500                      | 7,500                        | 4.7                           |                          |                       |                   |                       |                |                         |          |                   |  |   |
| BSAMW01   | PS05     | 2006 2nd Quarter | PSMW5-0606     | 6/27/2006   | 20.57                    | 391.74                       | 880,000        | 2,500                    | 2,500                      | 2,500                      | 2,500                      | 7,500                        | 4.7                           | 0.025                    | 2.5                   | 860               | 60                    |                | 0.54                    | -77.4    |                   |  |   |
| BSAMW01   | PS05     | 2006 3rd Quarter | PSMW5-0906     | 9/13/2006   | 22.85                    | 389.46                       | 570,000        | 2,500                    | 2,500                      | 2,500                      | 2,500                      | 7,500                        | 4.7                           | 0.025                    | 2.5                   | 790               | 26                    | 5,600          | 1.02                    | -161.3   |                   |  |   |
| BSAMW01   | PS05     | 2006 4th Quarter | PSMW5-1106     | 11/15/2006  | 24.18                    | 388.13                       | 630,000        | 2,500                    | 2,500                      | 2,500                      | 2,500                      | 7,500                        | 4.8                           | 0.025                    | 2.5                   | 730               | 29                    | 5,300          | 1.39                    | -121.2   |                   |  |   |
| BSAMW01   | PS05     | 2007 1st Quarter | PSMW5-0207     | 2/26/2007   | 23.05                    | 389.26                       | 91,000         | 770                      | 250                        | 250                        | 250                        | 750                          | 4.9                           | 0.025                    | 2.5                   | 830               | 23                    | 6,600          | 0.61                    | -142.2   |                   |  |   |
| BSAMW01   | PS05     | 2007 2nd Quarter | PSMW5-0507     | 5/29/2007   | 16.28                    | 396.03                       | 1,100,000      | 2,500                    | 2,500                      | 2,500                      | 2,500                      | 7,500                        | 5                             | 0.025                    | 250                   | 720               | 22                    | 4,200          | 0.92                    | -137.2   | 2.6               | 1.6                                      | 1.0   |
| BSAMW01   | PS05     | 2007 3rd Quarter | PSMW05-0907    | 9/24/2007   | 17.95                    | 394.36                       | 1,000,000      | 500                      | 500                        | 500                        | 500                        | 1,500                        | 4.8                           | 0.025                    | 2.5                   | 950               | 32 B                  | 4,500          | 0.41                    | -92.8    | 2.5               | 1.5                                      | 1.0   |
| BSAMW01   | PS05     | 2007 4th Quarter | PSMW05-1207    | 12/17/2007  | 20.15                    | 392.16                       | 890,000        | 500                      | 500                        | 500                        | 500                        | 1,500                        | 4.7                           | 0.025                    | 25                    | 850               | 23 B                  | 7,700          | 0.7                     | 30.4     | 2.2               | 2.1                                      | 0.1   |
| BSAMW01   | PS05     | 2008 1st Quarter | PSMW05-0308    | 3/24/2008   | 19.27                    | 393.04                       | 690,000        | 2,500                    | 2,500                      | 2,500                      | 2,500                      | 7,500                        | 4.7                           | 0.025                    | 2.5                   | 860               | 32 B                  | 6,500          | 2.4                     | -4.6     | 1.6               | 1.2                                      | 0.4   |
| BSAMW01   | PS05     | 2008 2nd Quarter | PSMW05-0608    | 6/18/2008   | 9.71                     | 402.60                       | 1,300,000      | 9,400                    | 2,500                      | 2,500                      | 2,500                      | 7,500                        | 4.75                          | 0.025                    | 210                   | 860               | 37                    | 11,000         | 0.24                    | -150.9   | 2.2               | 1.9                                      | 0.3   |
| BSAMW01   | PS05     | 2008 3rd Quarter |                | 8/26/2008   | 11.62                    | 400.69                       | 1,000,000      | 2,500                    | 2,500                      | 2,500                      | 2,500                      | 7,500                        |                               | 0.025                    | 130                   | 870               | 21                    | 10,000         | 0.57                    | -145.1   | 3.0               | 1.2                                      | 1.8   |
| BSAMW01   | PS05     | 2008 4th Quarter |                | 11/20/2008  | 16.00                    | 396.31                       | 1,200,000      | 5,000                    | 5,000                      | 5,000                      | 5,000                      | 15,000                       |                               | 0.025                    | 2.5                   | 930               | 32                    | 5,800          | 6.87                    | -130.7   | 2.5               | 2.1                                      | 0.4   |
| BSAMW01   | PS05     | 2009 1st Quarter |                | 3/2/2009    | 17.82                    | 394.49                       | 830,000        | 2,500                    | 2,500                      | 2,500                      | 2,500                      | 7,500                        | 4.85                          | 0.125                    | 2.5                   | 850               | 22                    | 11,000         | 10.24                   | -150.8   | 1.3               | 1.1                                      | 0.2   |
| BSAMW01   | PS05     | 2009 2nd Quarter |                | 6/4/2009    | 10.48                    | 401.83                       | 780,000        | 2,500                    | 2,500                      | 2,500                      | 2,500                      | 7,500                        |                               | 2.5                      | 2.5                   | 960               | 22                    | 5,500          | 0.75                    | -77.0    | 1.2               | 0.9                                      | 0.3   |
| BSAMW01   | PS05     | 2009 3rd Quarter |                | 8/20/2009   | 14.84                    | 397.47                       | 940,000        | 2,500                    | 2,500                      | 2,500                      | 2,500                      | 7,500                        | 4.7                           | 0.025                    | 2.5                   | 900               | 11.5                  | 13,000         | 4.55                    | -142.2   | 1.8               | 1.6                                      | 0.2   |
| BSAMW01   | PS05     | 2009 4th Quarter |                | 11/18/2009  | 12.57                    | 399.74                       | 600,000        | 2500                     | 2500                       | 2500                       | 2500                       | 7,500                        |                               | 0.025                    | 2.5                   | 790               | 27                    | 15000          | 1.57                    | -155.0   | 2.2               | 1.7                                      | 0.5   |
| BSAMW01   | PS05     | 2010 1st Quarter |                | 2/17/2010   | 13.22                    | 399.09                       | 730,000        | 2500                     | 2500                       | 2500                       | 2500                       | 7,500                        | 4.85                          | 0.025                    | 2.5                   | 920               | 33                    | 8700           | 0.06                    | -145.9   | 2.4               | 2.2                                      | 0.2   |
| BSAMW01   | PS05     | 2010 2nd Quarter |                | 5/19/2010   | 11.05                    | 401.26                       | 840,000        | 2500                     | 2500                       | 2500                       | 2500                       | 7,500                        |                               | 0.025                    | 2.5                   | 930               | 31                    | 8400           | 0.6                     | 123.2    | 1.9               | 1.6                                      | 0.3   |
|   |          |                  |                |             |                          |                              |                |                          |                            |                            |                            |                              |                               |                          |                       |                   |                       |                |                         |          |                   |  |   |
| BSAMW02   | PS08     | 2006 1st Quarter | PSMW8-0306     | 3/22/2006   | 28.12                    | 387.01                       | 11,000         | 2,100                    | 50                         | 50                         | 100                        | 100                          | 4.7                           |                          |                       |                   |                       |                |                         |          |                   |  |   |
| BSAMW02   | PS08     | 2006 2nd Quarter | PSMW8-0606     | 6/26/2006   | 24.28                    | 390.85                       | 1,900          | 1,700                    | 1                          | 1                          | 7                          | 7                            | 4.7                           | 0.025                    | 370                   | 600               | 55                    | 1,800          | 0.9                     | -75.6    |                   |  |   |
| BSAMW02   | PS08     | 2006 3rd Quarter | PSMW8-0906     | 9/8/2006    | 27.85                    | 387.28                       | 11,000         | 2,300                    | 25                         | 25                         | 25                         | 75                           | 4.7                           | 0.025                    | 300                   | 570               | 72                    | 520            | 0.67                    | -131.9   |                   |  |   |
| BSAMW02   | PS08     | 2006 4th Quarter | PSMW8-1106     | 11/27/2006  | 29.01                    | 386.12                       | 5,500          | 1,700                    | 25                         | 25                         | 25                         | 75                           | 4.8                           | 0.025                    | 370                   | 600               | 59                    | 770            | 1.3                     | -100.9   |                   |  |   |
| BSAMW02   | PS08     | 2007 1st Quarter | PSMW8-0207     | 2/26/2007   | 27.60                    | 387.53                       | 4,000          | 1,900                    | 25                         | 25                         | 25                         | 75                           | 4.8                           | 0.025                    | 530                   | 640               | 29                    | 600            | 0.73                    | -223.7   |                   |  |   |
| BSAMW02   | PS08     | 2007 2nd Quarter | PSMW8-0507     | 5/24/2007   | 18.45                    | 396.68                       | 1,400          | 1,100                    | 8                          | 3                          | 13                         | 21                           | 5                             | 0.025                    | 270                   | 710               | 22                    | 530            | 2.19                    | -118     | 2.1               | 1.8                                      | 0.3   |
| BSAMW02   | PS08     | 2007 3rd Quarter | PSMW08-0907    | 9/20/2007   | 21.53                    | 393.60                       | 810            | 1,700                    | 10                         | 10                         | 10                         | 30                           | 4.7                           | 0.025                    | 450                   | 640               | 29                    | 470            | 0.21                    | -88.9    | 3.3               | 3.1                                      | 0.2   |
| BSAMW02   | PS08     | 2007 4th Quarter | PSMW08-1207    | 12/12/2007  | 24.62                    | 390.51                       | 2,400          | 1,600                    | 10                         | 10                         | 10                         | 30                           | 4.85                          | 0.025                    | 400                   | 650               | 28                    | 470            | 0.42                    | -16.9    | 3.8               | 3.4                                      | 0.4   |
| BSAMW02   | PS08     | 2008 1st Quarter | PSMW08-0308    | 3/25/2008   | 22.58                    | 392.55                       | 240            | 1,500                    | 5                          | 5                          | 5                          | 15                           | 4.7                           | 0.025                    | 430                   | 660               | 35                    | 850            | 2.4                     | -3.6     | 3.6               | 3.3                                      | 0.3   |
| BSAMW02   | PS08     | 2008 2nd Quarter | PSMW08-0608    | 6/17/2008   | 12.29                    | 402.84                       | 11,000         | 2,000                    | 50                         | 50                         | 50                         | 150                          | 5                             | 0.025                    | 25                    | 730               | 45                    | 5,000          | 0.32                    | -136.2   | 2.1               | 1.9                                      | 0.2   |
| BSAMW02   | PS08     | 2008 3rd Quarter |                | 8/21/2008   | 15.10                    | 400.03                       | 18,000         | 1,700                    | 100                        | 100                        | 100                        | 300                          |                               | 0.025                    | 130                   | 710               | 26                    | 3,600          | 0.06                    | 35.8     | 2.9               | 1.3                                      | 1.6   |
| BSAMW02   | PS08     | 2008 4th Quarter |                | 11/24/2008  | 20.31                    | 394.82                       | 16,000         | 2,500                    | 100                        | 100                        | 100                        | 300                          |                               | 0.025                    | 110                   | 660               | 29                    | 3,300          | 5.8                     | -112     | 1.8               | 1.7                                      | 0.1   |
| BSAMW02   | PS08     | 2009 1st Quarter |                | 2/26/2009   | 22.27                    | 392.86                       | 20,000         | 2,900                    | 100                        | 100                        | 5                          | 205                          | 4.85                          | 0.025                    | 160                   | 700               | 17                    | 3,200          | 7.13                    | -166.3   | 1.4               | 1.3                                      | 0.1   |
| BSAMW02   | PS08     | 2009 2nd Quarter |                | 6/3/2009    | 13.05                    | 402.08                       | 45,000         | 2,400                    | 100                        | 100                        | 100                        | 300                          |                               | 0.073                    | 2.5                   | 760               | 37                    | 20000          | 0.55                    | -79.2    | 1.6               | 1.4                                      | 0.2   |
| BSAMW02   | PS08     | 2009 3rd Quarter |                | 8/19/2009   | 19.45                    | 395.68                       | 72000          | 5000                     | 100                        | 100                        | 100                        | 300                          | 4.7                           | 0.025                    | 2.5                   | 700               | 18                    | 11000          | 1.18                    | -136     | 1.5               | 1.2                                      | 0.3   |
| BSAMW02   | PS08     | 2009 4th Quarter |                | 11/17/2009  | 15.62                    | 399.51                       | 69000          | 2600                     | 500                        | 500                        | 500                        | 1,500                        |                               | 0.025                    | 2.5                   | 670               | 37                    | 15000          | 1.12                    | -128     | 1.8               | 1.8                                      | 0.0   |
| BSAMW02   | PS08     | 2010 1st Quarter |                | 2/17/2010   | 17.23                    | 397.90                       | 150000         | 2700                     | 500                        | 500                        | 500                        | 1,500                        | 4.75                          | 0.025                    | 2.5                   | 700               | 57                    | 9100           | 0.09                    | -160.6   | 1.9               | 1.8                                      | 0.1   |
| BSAMW02   | PS08     | 2010 2nd Quarter |                | 5/25/2010   | 14.00                    | 401.13                       | 120,000        | 1,300                    | 500                        | 500                        | 500                        | 1,500                        |                               | 0.025                    | 2.5                   | 720               | 60                    | 28000          | 6.45                    | -92.5    | 3.2               | 3.0                                      | 0.2   |
|   |          |                  |                |             |                          |                              |                |                          |                            |                            |                            |                              |                               |                          |                       |                   |                       |                |                         |          |                   |  |   |
| BSAMW02-DUP   | PS08-DUP | 2007 1st Quarter | PSMW8-0207-AD  | 2/26/2007   | 27.60                    | 387.53                       | 3,800          | 2,000                    | 25                         | 25                         | 25                         | 75                           | 4.85                          | 0.072                    | 540                   | 640               | 27                    | 630            | 0.73                    | -223.7   |                   |  |   |
| BSAMW02-DUP   | PS08-DUP | 2007 2nd Quarter | PSMW8-0507-AD  | 5/24/2007   | 18.45                    | 396.68                       | 880            | 730                      | 3                          | 3                          | 8                          | 8                            | 4.8                           |                          |                       |                   |                       |                |                         |          |                   |  |   |
| BSAMW02-DUP   | PS08-DUP | 2007 3rd Quarter | PSMW08-0907-AD | 9/20/2007   | 21.53                    | 393.60                       | 750            | 1,600                    | 2                          | 1                          | 8                          | 10                           | 4.7                           |                          |                       |                   |                       |                |                         |          |                   |  |   |
| BSAMW02-DUP   | PS08-DUP | 2007 4th Quarter | PSMW08-1207-AD | 12/12/2007  | 24.62                    | 390.51                       | 2,700          | 1,600                    | 4                          | 1                          | 10                         | 14                           | 4.7                           |                          |                       |                   |                       |                |                         |          |                   |  |   |
| BSAMW02-DUP   | PS08-DUP | 2008 1st Quarter | PSMW08-0308-AD | 3/25/2008   | 22.58                    | 392.55                       | 240            | 1,500                    | 5                          | 5                          | 5                          | 15                           | 5                             |                          |                       |                   |                       |                |                         |          |                   |  |   |
| BSAMW02-DUP   | PS08-DUP | 2008 2nd Quarter | PSMW08-0608-AD | 6/17/2008   | 12.29                    | 402.84                       | 11,000         | 2,000                    | 50                         | 50                         | 50                         | 150                          | 4.85                          |                          |                       |                   |                       |                |                         |          |                   |  |   |



**ATTACHMENT A**  
Supporting Data for MNA Evalaution 3Q08 through 2Q10

| Location    | Point ID  | Quarterly Effort | Sample ID       | Sample Date | Water Level (Depth, ft.) | Groundwater Eelvation (feet) | Benzene (ug/L) | Monochlorobenzene (ug/L) | 1,2-Dichlorobenzene (ug/L) | 1,3-Dichlorobenzene (ug/L) | 1,4-Dichlorobenzene (ug/L) | Total Dichlorobenzene (ug/L) | 1,2,4-Trichlorobenzene (ug/L) | Nitrogen, Nitrate (mg/L) | Sulfate as SO <sub>4</sub> (mg/L) | Alkalinity (mg/L) | Carbon Dioxide (mg/L) | Methane (ug/L) | Dissolved Oxygen (mg/L) | ORP (mV) | Total Iron (mg/L) | Dissolved Iron (Fe <sup>2+</sup> , mg/L) | Total Iron - Fe <sup>2+</sup> (mg/L) Assumed to be Fe <sup>3+</sup> |
|-------------|-----------|------------------|-----------------|-------------|--------------------------|------------------------------|----------------|--------------------------|----------------------------|----------------------------|----------------------------|------------------------------|-------------------------------|--------------------------|-----------------------------------|-------------------|-----------------------|----------------|-------------------------|----------|-------------------|--|---|
| BSAMW03     | PS12      | 2006 1st Quarter | PSMW12-0306     | 3/22/2006   | 29.99                    | 385.75                       | 63             | 1,100                    | 28                         | 28                         | 520                        | 576                          | 4.75                          |                          |                                   |                   |                       |                |                         |          |                   |  |   |
| BSAMW03     | PS12      | 2006 2nd Quarter | PSMW12-0606     | 6/27/2006   | 26.54                    | 389.20                       | 53             | 1,400                    | 26                         | 20                         | 520                        | 566                          | 4.7                           | 0.025                    | 320                               | 490               | 21                    | 300            | 0.31                    | -102     |                   |  |   |
| BSAMW03     | PS12      | 2006 3rd Quarter | PSMW12-0906     | 9/7/2006    | 30.77                    | 384.97                       | 56             | 1,200                    | 24                         | 26                         | 530                        | 580                          | 4.7                           | 0.025                    | 260                               | 480               | 27                    | 270            | 0.77                    | -133.2   |                   |  |   |
| BSAMW03     | PS12      | 2006 4th Quarter | PSMW12-1106     | 11/16/2006  | 31.88                    | 383.86                       | 100            | 960                      | 22                         | 15                         | 380                        | 417                          | 4.8                           | 0.025                    | 240                               | 460               | 93                    | 300            | 0.29                    | -103.5   |                   |  |   |
| BSAMW03     | PS12      | 2007 1st Quarter | PSMW12-0207     | 2/20/2007   | 30.22                    | 385.52                       | 78             | 870                      | 22                         | 25                         | 400                        | 447                          | 4.7                           | 0.025                    | 270                               | 480               | 36                    | 410            | 0.23                    | -56.2    |                   |  |   |
| BSAMW03     | PS12      | 2007 2nd Quarter | PSMW12-0507     | 5/24/2007   | 18.04                    | 397.70                       | 44             | 1,100                    | 20                         | 23                         | 440                        | 483                          | 5                             | 0.025                    | 260                               | 510               | 21                    | 290            | 1.23                    | -108.2   | 11.0              | 12.0                                     | 0.0   |
| BSAMW03     | PS12      | 2007 3rd Quarter | PSMW12-0907     | 9/24/2007   | 22.27                    | 393.47                       | 49             | 1,300                    | 28                         | 10                         | 520                        | 548                          | 4.7                           | 0.025                    | 300                               | 490               | 38 B                  | 260            | 0.47                    | -86.8    | 12.0              | 11.0                                     | 1.0   |
| BSAMW03     | PS12      | 2007 4th Quarter | PSMW12-1207     | 12/18/2007  | 27.52                    | 388.22                       | 150            | 870                      | 14                         | 13                         | 300                        | 313                          | 4.7                           | 0.025                    | 290                               | 490               | 40 B                  | 330            | 0.96                    | 16.2     | 12.0              | 12.0                                     | 0.0   |
| BSAMW03     | PS12      | 2008 1st Quarter | PSMW12-0308     | 3/25/2008   | 22.69                    | 393.05                       | 73             | 1,200                    | 13                         | 13                         | 260                        | 286                          | 4.9                           | 0.025                    | 290                               | 500               | 36 B                  | 340            | 47.7                    | -6.5     | 12.0              | 11.0                                     | 1.0   |
| BSAMW03     | PS12      | 2008 2nd Quarter | PSMW12-0608     | 6/17/2008   | 12.01                    | 403.73                       | 31             | 1,700                    | 29                         | 21                         | 460                        | 510                          | 4.75                          | 0.025                    | 210                               | 500               | 43                    | 220            | 0.39                    | -112.5   | 10.0              | 9.9                                      | 0.1   |
| BSAMW03     | PS12      | 2008 3rd Quarter |                 | 8/25/2008   | 18.78                    | 396.96                       | 30             | 1,500                    | 14                         | 3,400                      | 30                         | 3,444                        |                               | 0.025                    | 230                               | 500               | 19                    | 250            | 0.53                    | -125.1   | 12.0              | 9.9                                      | 2.1   |
| BSAMW03     | PS12      | 2008 4th Quarter |                 | 11/21/2008  | 23.20                    | 392.54                       | 97             | 1,300                    | 22                         | 440                        | 97                         | 559                          |                               | 0.025                    | 260                               | 500               | 8.2                   | 320            | 6.48                    | -102.6   | 11.0              | 11.0                                     | 0.0   |
| BSAMW03     | PS12      | 2009 1st Quarter |                 | 3/2/2009    | 23.98                    | 391.76                       | 120            | 1,200                    | 14                         | 370                        | 120                        | 504                          | 4.85                          | 0.125                    | 240                               | 490               | 26                    | 540            | 9.23                    | -139.2   | 12.0              | 12.0                                     | 0.0   |
| BSAMW03     | PS12      | 2009 2nd Quarter |                 | 6/4/2009    | 13.50                    | 402.24                       | 30             | 1,300                    | 43                         | 18                         | 410                        | 471                          |                               | 4.7                      | 200                               | 500               | 23                    | 320            | 0.84                    | -109     | 10.0              | 10.0                                     | 0.0   |
| BSAMW03     | PS12      | 2009 3rd Quarter |                 | 8/19/2009   | 22.66                    | 393.08                       | 68             | 1100                     | 32                         | 10                         | 330                        | 372                          | 4.7                           | 0.025                    | 260                               | 510               | 16                    | 440            | 2.54                    | -135     | 12.0              | 12.0                                     | 0.0   |
| BSAMW03     | PS12      | 2009 4th Quarter |                 | 11/17/2009  | 15.95                    | 399.79                       | 78             | 1300                     | 39                         | 5                          | 460                        | 504                          | NA                            | 0.025                    | 240                               | 480               | 43                    | 200            | 1.4                     | -128     | 9.6               | 10.0                                     | 0.0   |
| BSAMW03     | PS12      | 2010 1st Quarter |                 | 2/16/2010   | 19.45                    | 396.29                       | 87             | 1200                     | 46                         | 20                         | 430                        | 496                          | 4.85                          | 0.025                    | 170                               | 490               | 48                    | 190            | 148.7                   | -148.7   | 9.8               | 9.4                                      | 0.4   |
| BSAMW03     | PS12      | 2010 2nd Quarter |                 | 5/25/2010   | 14.28                    | 401.46                       | 94             | 1,500                    | 71                         | 31                         | 590                        | 692                          |                               | 0.025                    | 260                               | 500               | 34                    | 380            | 4.3                     | 104.5    | 11.0              | 11.0                                     | 0.0   |
| BSAMW03-DUP | PS12-DUP  | 2006 1st Quarter | PSMW12-0306-AD  | 3/22/2006   | 29.99                    | 385.75                       | 61             | 1,000                    | 26                         | 26                         | 470                        | 522                          | 4.7                           |                          |                                   |                   |                       |                |                         |          |                   |  |   |
| BSAMW03-DUP | PS12-DUP  | 2006 4th Quarter | PSMW12-1106-AD  | 11/16/2006  | 31.88                    | 383.86                       | 86             | 980                      | 21                         | 5                          | 400                        | 421                          | 4.85                          |                          |                                   |                   |                       |                |                         |          |                   |  |   |
| BSAMW03-DUP | PS12-DUP  | 2007 1st Quarter | PSMW12-0207-AD  | 2/20/2007   | 30.22                    | 385.52                       | 90             | 1,000                    | 24                         | 32                         | 510                        | 566                          | 4.8                           | 0.025                    | 280                               | 480               | 33                    | 400            | 0.23                    | -56.2    |                   |  |   |
| BSAMW03-DUP | PS12-DUP  | 2007 3rd Quarter | PSMW12-0907-AD  | 9/24/2007   | 22.27                    | 393.47                       | 50             | 1,300                    | 29                         | 10                         | 540                        | 569                          | 4.7                           |                          |                                   |                   |                       |                |                         |          |                   |  |   |
| BSAMW04     | PS16D     | 2006 2nd Quarter | PSMW16D-0606    | 6/26/2006   | 37.67                    | 387.02                       | 53             | 2,300                    | 10                         | 2                          | 90                         | 102                          | 4.7                           | 0.025                    | 150                               | 610               | 63                    | 1,800          | 0.45                    | -121.1   |                   |  |   |
| BSAMW04     | PS16D     | 2006 3rd Quarter | PSMW16D-0906    | 9/5/2006    | 41.17                    | 383.52                       | 51             | 2,100                    | 10                         | 10                         | 100                        | 120                          | 4.75                          | 0.025                    | 200                               | 590               | 58                    | 1,900          | 0.82                    | -121.6   |                   |  |   |
| BSAMW04     | PS16D     | 2006 4th Quarter | PSMW16D-1106    | 11/14/2006  | 42.94                    | 381.75                       | 38             | 1,600                    | 10                         | 10                         | 81                         | 101                          | 4.7                           | 0.025                    | 230                               | 560               | 190                   | 610            | 0.83                    | -92.3    |                   |  |   |
| BSAMW04     | PS16D     | 2007 1st Quarter | PSMW16D-0207    | 2/20/2007   | 41.64                    | 383.05                       | 32             | 1,300                    | 5                          | 5                          | 74                         | 84                           | 4.85                          | 0.025                    | 260                               | 520               | 38                    | 760            | 0.74                    | 166.6    |                   |  |   |
| BSAMW04     | PS16D     | 2007 2nd Quarter | PSMW16D-0507    | 5/29/2007   | 26.30                    | 398.39                       | 4,500          | 2,800                    | 25                         | 25                         | 63                         | 113                          | 5                             | 0.025                    | 72                                | 590               | 36                    | 2,600          | 0.68                    | -117.5   | 10.0              | 9.5                                      | 0.5   |
| BSAMW04     | PS16D     | 2007 3rd Quarter | PSMW16D-0907    | 9/19/2007   | 31.05                    | 393.64                       | 2,100          | 1,200                    | 9                          | 2                          | 63                         | 73                           | 4.7                           | 0.025                    | 180                               | 580               | 36                    | 1,300          | 0.27                    | -86.9    | 9.9               | 9.4                                      | 0.5   |
| BSAMW04     | PS16D     | 2007 4th Quarter | PSMW16D-1207    | 12/11/2007  | 39.31                    | 385.38                       | 1,100          | 1,800                    | 10                         | 10                         | 49                         | 69                           | 4.8                           | 0.025                    | 160                               | 570               | 31                    | 830            | 0.53                    | 182.7    | 8.9               | 9.1                                      | 0.0   |
| BSAMW04     | PS16D     | 2008 1st Quarter | PSMW16D-0308    | 3/19/2008   | 31.29                    | 393.40                       | 130            | 1,900                    | 10                         | 10                         | 32                         | 52                           | 4.85                          | 0.025                    | 180                               | 560               | 40                    | 110            | 3.7                     | 10.7     | 8.6               | 8.5                                      | 0.1   |
| BSAMW04     | PS16D     | 2008 2nd Quarter | PSMW16D-0608    | 6/11/2008   | 19.60                    | 405.09                       | 120            | 2,500                    | 22                         | 10                         | 59                         | 91                           | 4.9                           | 0.025                    | 82                                | 720               | 38                    | 370            | 0.84                    | -93.8    | 8.7               | 8.2                                      | 0.5   |
| BSAMW04     | PS16D     | 2008 3rd Quarter |                 | 8/25/2008   | 31.05                    | 393.64                       | 48             | 2,600                    | 13                         | 5                          | 49                         | 67                           |                               | 0.025                    | 85                                | 660               | 27                    | 170            | 0.48                    | -118     | 9.6               | 9.3                                      | 0.3   |
| BSAMW04     | PS16D     | 2008 4th Quarter |                 | 11/20/2008  | 34.36                    | 390.33                       | 590            | 2,300                    | 37                         | 10                         | 73                         | 120                          |                               | 0.025                    | 130                               | 600               | 40                    | 84             | 5.85                    | -86.9    | 8.3               | 8.1                                      | 0.2   |
| BSAMW04     | PS16D     | 2009 1st Quarter |                 | 2/25/2009   | 33.76                    | 390.93                       | 82             | 2,300                    | 26                         | 10                         | 64                         | 100                          | 4.7                           | 0.025                    | 130                               | 600               | 22                    | 110            | 6.28                    | -122.5   | 8.7               | 8.6                                      | 0.1   |
| BSAMW04     | PS16D     | 2009 2nd Quarter |                 | 6/4/2009    | 21.23                    | 403.46                       | 26             | 3,100                    | 34                         | 10                         | 86                         | 130                          |                               | 0.025                    | 2.5                               | 720               | 36                    | 330            | 0.88                    | -91      | 9.8               | 8.9                                      | 0.9   |
| BSAMW04     | PS16D     | 2009 3rd Quarter |                 | 8/18/2009   | 33.90                    | 390.79                       | 99             | 2700                     | 20                         | 26                         | 61                         | 107                          | 4.85                          | 0.025                    | 120                               | 650               | 66 B                  | 270            | 1.11                    | -172.3   | 8.1               | 7.9                                      | 0.2   |
| BSAMW04     | PS16D     | 2009 4th Quarter |                 | 11/16/2009  | 24.81                    | 399.88                       | 23             | 2400                     | 26                         | 10                         | 80                         | 116                          |                               | 0.025                    | 100                               | 600               | 58                    | 140            | 1.19                    | -103.1   | 9.1               | 8.5                                      | 0.6   |
| BSAMW04     | PS16D     | 2010 1st Quarter |                 | 2/16/2010   | 29.98                    | 394.71                       | 73             | 2700                     | 22                         | 10                         | 68                         | 100                          | 4.7                           | 0.025                    | 120                               | 610               | 63                    | 220            | 0.2                     | -155     | 7.2               | 8.2                                      | 0.0   |
| BSAMW04     | PS16D     | 2010 2nd Quarter |                 | 5/20/2010   |                          |                              | 26             | 2,800                    | 80                         | 10                         | 140                        | 230                          |                               | 0.025                    | 45                                | 660               | 36                    | 86             | 0.39                    | 163.8    | 9.3               | 9.3                                      | 0.0   |
| BSAMW04-DUP | PS16D-DUP | 2006 2nd Quarter | PSMW16D-0606-AD | 6/26/2006   | 37.67                    | 387.02                       | 50             | 2,000                    | 10                         | 10                         | 76                         | 76                           | 4.7                           | 0.025                    | 150                               | 610               | 59                    | 1,900          |                         |          |                   |  |   |



ATTACHMENT A  
Supporting Data for MNA Evalauton 3Q08 through 2Q10

| Location    | Point ID | Quarterly Effort | Sample ID       | Sample Date | Water Level (Depth, ft.) | Groundwater Eelvation (feet) | Benzene (ug/L) | Monochlorobenzene (ug/L) | 1,2-Dichlorobenzene (ug/L) | 1,3-Dichlorobenzene (ug/L) | 1,4-Dichlorobenzene (ug/L) | Total Dichlorobenzene (ug/L) | 1,2,4-Trichlorobenzene (ug/L) | Nitrogen, Nitrate (mg/L) | Sulfate as SO4 (mg/L) | Alkalinity (mg/L) | Carbon Dioxide (mg/L) | Methane (ug/L) | Dissolved Oxygen (mg/L) | ORP (mV) | Total Iron (mg/L) | Dissolved Iron (Fe <sup>2+</sup> , mg/L) | Total Iron - Fe <sup>2+</sup> (mg/L) Assumed to be Fe <sup>3+</sup> |
|-------------|----------|------------------|-----------------|-------------|--------------------------|------------------------------|----------------|--------------------------|----------------------------|----------------------------|----------------------------|------------------------------|-------------------------------|--------------------------|-----------------------|-------------------|-----------------------|----------------|-------------------------|----------|-------------------|--|---|
| BSAMW05     | PS15D    | 2006 2nd Quarter | PSMW15D-0606    | 6/26/2006   | 33.90                    | 386.59                       | 6,800          | 1,300                    | 25                         |                            | 25                         | 50                           | 4.7                           | 0.025                    | 2.5                   | 780               | 120                   | 15,000         | 1.01                    | -96.3    |                   |  |   |
| BSAMW05     | PS15D    | 2006 3rd Quarter | PSMW15D-0906    | 9/5/2006    | 36.58                    | 383.91                       | 6,200          | 1,200                    | 25                         |                            | 25                         | 50                           | 4.7                           | 0.025                    | 2.5                   | 780               | 74                    | 15,000         | 0.91                    | -122.5   |                   |  |   |
| BSAMW05     | PS15D    | 2006 4th Quarter | PSMW15D-1106    | 11/27/2006  | 39.60                    | 380.89                       | 4,600          | 600                      | 25                         |                            | 25                         | 50                           | 5                             | 0.025                    | 2.5                   | 810               | 95                    | 11,000         | 0.77                    | -72.8    |                   |  |   |
| BSAMW05     | PS15D    | 2007 1st Quarter | PSMW15D-0207    | 2/21/2007   | 38.42                    | 382.07                       | 4,100          | 490                      | 25                         |                            | 25                         | 50                           | 4.85                          | 0.025                    | 2.5                   | 740               | 55                    | 14,000         | 0.44                    | 14.5     |                   |  |   |
| BSAMW05     | PS15D(R) | 2007 2nd Quarter | PSMW15D(R)-0507 | 6/25/2007   | 26.27                    | 394.22                       | 3,500          | 330                      | 1                          | 1                          | 1                          | 1                            | 4.7                           | 0.025                    | 2.5                   | 790               | 70                    | 6,400          | 0.31                    | -121     | 24.0              | 23.0                                     | 1.0   |
| BSAMW05     | PS15D(R) | 2007 3rd Quarter | PSMW15D(R)-0907 | 9/18/2007   | 31.32                    | 389.17                       | 440            | 180                      | 1                          | 1                          | 1                          | 2                            | 10                            | 0.025                    | 2.5                   | 770               | 51                    | 20,000         | 0.33                    | -108.5   | 21.0              | 20.0                                     | 1.0   |
| BSAMW05     | PS15D(R) | 2007 4th Quarter | PSMW15D(R)-1207 | 12/13/2007  | 36.62                    | 383.87                       | 140            | 190                      | 1                          | 1                          | 1                          | 1                            | 4.8                           | 0.025                    | 2.5                   | 830               | 36                    |                | 0.85                    | 216.3    | 19.0              | 17.0                                     | 2.0   |
| BSAMW05     | PS15D(R) | 2008 1st Quarter | PSMW15D(R)-0308 | 3/18/2008   | 23.34                    | 397.15                       | 1              | 4                        | 1                          | 1                          | 1                          | 2                            | 4.85                          | 0.025                    | 150                   | 590               | 25                    | 300            | 2.7                     | -13      | 20.0              | 18.0                                     | 2.0   |
| BSAMW05     | PS15D(R) | 2008 2nd Quarter | PSMW15D(R)-0608 | 6/12/2008   | 12.35                    | 408.14                       | 1              | 9                        | 6                          | 1                          | 7                          | 13                           | 4.85                          | 0.025                    | 200                   | 590               | 28                    | 110            | 0.3                     | -129     | 19.0              | 16.0                                     | 3.0   |
| BSAMW05     | PS15D(R) | 2008 3rd Quarter |                 | 8/20/2008   | 28.45                    | 392.04                       | 18             | 300                      | 4                          | 1                          | 5                          | 9                            |                               | 0.025                    | 51                    | 830               | 35                    | 1,300          | 0.16                    | -1.8     | 19.0              | 19.0                                     | 0.0   |
| BSAMW05     | PS15D(R) | 2008 4th Quarter |                 | 11/21/2008  | 30.90                    | 389.59                       | 130            | 310                      | 19                         | 1                          | 20                         | 39                           |                               | 0.025                    | 5                     | 780               | 20                    | 5,700          | 6.68                    | -100.2   | 17.0              | 17.0                                     | 0.0   |
| BSAMW05     | PS15D(R) | 2009 1st Quarter |                 | 2/25/2009   | 29.08                    | 391.41                       | 2              | 270                      | 12                         | 2                          | 15                         | 27                           | 4.7                           | 0.025                    | 2.5                   | 810               | 17                    | 13,000         | 5.27                    | -171.9   | 19.0              | 18.0                                     | 1.0   |
| BSAMW05     | PS15D(R) | 2009 2nd Quarter |                 | 6/9/2009    | 17.95                    | 402.54                       | 4              | 510                      | 11                         | 2                          | 8                          | 19                           |                               | 5.1                      | 65                    | 830               | 54                    | 310            | 3.13                    | -84      | 17.0              | 17.0                                     | 0.0   |
| BSAMW05     | PS15D(R) | 2009 3rd Quarter |                 | 8/26/2009   | 29.19                    | 391.30                       | 13             | 330                      | 10                         | 2                          | 13                         | 23                           | 4.7                           | 0.025                    | 2.5                   | 840               | 78 B                  | 11000          | 2.33                    | -129.7   | 17.0              | 16.0                                     | 1.0   |
| BSAMW05     | PS15D(R) | 2009 4th Quarter |                 | 11/16/2009  | 19.34                    | 401.15                       | 2.5            | 300                      | 150                        | 16                         | 150                        | 316                          |                               | 0.025                    | 2.5                   | 760               | 67                    | 12000          | 1.13                    | -69.3    | 16.0              | 15.0                                     | 1.0   |
| BSAMW05     | PS15D(R) | 2010 1st Quarter |                 | 2/15/2010   | 26.07                    | 394.42                       | 2.5            | 350                      | 190                        | 16                         | 140                        | 346                          | 4.7                           | 0.025                    | 2.5                   | 790               | 31                    | 14000          | 0.12                    | -153.3   | 14.0              | 15.0                                     | 0.0   |
| BSAMW05     | PS15D(R) | 2010 2nd Quarter |                 | 5/24/2010   | 15.13                    | 405.36                       | 8.9            | 290                      | 42                         | 5.1                        | 37                         | 84                           |                               | 0.025                    | 2.5                   | 2.5               | 2.5                   | 3500           | 0.53                    | -139.2   | 17.0              | 16.0                                     | 1.0   |
| CPAMW01     | PS03     | 2006 1st Quarter | PSMW3-0306      | 3/23/2006   | 17.52                    | 390.80                       | 6,500          | 24,000                   | 39,000                     | 2,400                      | 20,000                     | 61,400                       | 1500                          |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW01     | PS03     | 2006 2nd Quarter | PSMW3-0606      | 6/29/2006   | 15.37                    | 392.95                       | 2,900          | 16,000                   | 21,000                     | 1,200                      | 11,000                     | 33,200                       | 850                           | 0.025                    | 12                    | 1200              | 1.3                   | 17,000         | 0.34                    | -109.2   |                   |  |   |
| CPAMW01     | PS03     | 2006 3rd Quarter | PSMW3-0806      | 8/31/2006   | 17.07                    | 391.25                       | 3,200          | 19,000                   | 25,000                     | 1,900                      | 15,000                     | 41,900                       | 1100                          | 0.25                     | 14                    | 1200              | 1.1                   | 20,000         | 1.7                     | -21.3    |                   |  |   |
| CPAMW01     | PS03     | 2006 4th Quarter | PSMW3-1106      | 11/15/2006  | 18.16                    | 390.16                       | 3,800          | 16,000                   | 23,000                     | 1,600                      | 13,000                     | 37,600                       | 930                           | 0.25                     | 14                    | 1100              | 1.3                   | 11,000         | 0.57                    | 8.5      |                   |  |   |
| CPAMW01     | PS03     | 2007 1st Quarter | PSMW3-0207      | 2/27/2007   | 17.45                    | 390.87                       | 4,300          | 13,000                   | 21,000                     | 1,200                      | 10,000                     | 32,200                       | 1900                          | 0.125                    | 7.5                   | 1000              | 0.5                   | 21,000         | 0.69                    | -224.3   |                   |  |   |
| CPAMW01     | PS03     | 2007 2nd Quarter | PSMW3-0507      | 5/29/2007   | 11.71                    | 396.61                       | 2,800          | 17,000                   | 25,000                     | 1,600                      | 14,000                     | 40,600                       | 850                           | 0.025                    | 2.5                   | 1100              | 0.5                   | 8,200          | 1.09                    | -41      | 3.2               | 2.0                                      | 1.2   |
| CPAMW01     | PS03     | 2007 3rd Quarter | PSMW03-0907     | 9/25/2007   | 13.11                    | 395.21                       | 2,800          | 13,000                   | 26,000                     | 1,700                      | 14,000                     | 41,700                       | 920                           | 0.25                     | 11                    | 1100              | 0.5                   | 12,000         | 0.83                    | -92      |                   | 1.5                                      |   |
| CPAMW01     | PS03     | 2007 4th Quarter | PSMW03-1207     | 12/17/2007  | 14.98                    | 393.34                       | 3,000          | 12,000                   | 21,000                     | 1,300                      | 11,000                     | 33,300                       | 1500                          | 0.125                    | 12                    | 1200              | 0.5                   | 22,000         | 1.28                    | 22.4     | 2.4               | 2.2                                      | 0.2   |
| CPAMW01     | PS03     | 2008 1st Quarter | PSMW03-0308     | 3/25/2008   | 14.38                    | 393.94                       | 2,600          | 15,000                   | 15,000                     | 980                        | 7,800                      | 23,780                       | 1100                          | 0.125                    | 2.5                   | 1100              | 0.5                   | 20,000         | 340.4                   | -11.5    | 2.9               | 2.3                                      | 0.6   |
| CPAMW01     | PS03     | 2008 2nd Quarter | PSMW03-0608     | 6/18/2008   | 5.93                     | 402.39                       | 3,400          | 18,000                   | 30,000                     | 1,700                      | 16,000                     | 47,700                       | 1500                          | 0.25                     | 17                    | 1200              | 0.5                   | 24,000         | 0.08                    | -20.7    | 3.0               | 2.3                                      | 0.7   |
| CPAMW01     | PS03     | 2008 3rd Quarter |                 | 8/26/2008   | 7.45                     | 400.87                       | 3,100          | 15,000                   | 22,000                     | 1,400                      | 12,000                     | 35,400                       |                               | 0.25                     | 14                    | 1200              | 0.5                   | 21,000         | -0.01                   | -21.1    | 2.6               | 1.8                                      | 0.8   |
| CPAMW01     | PS03     | 2008 4th Quarter |                 | 11/20/2008  | 11.07                    | 397.25                       | 3,200          | 13,000                   | 22,000                     | 1,400                      | 12,000                     | 35,400                       |                               | 0.25                     | 13                    | 1100              | 2                     | 15,000         | 0.25                    | 2.5      | 1.7               | 1.4                                      | 0.3   |
| CPAMW01     | PS03     | 2009 1st Quarter |                 | 3/2/2009    | 12.41                    | 395.91                       | 4,200          | 16,000                   | 20,000                     | 1,400                      | 12,000                     | 33,400                       | 660                           | 0.25                     | 5.7                   | 1100              | 2.5                   | 30,000         | 9.26                    | -123.6   | 1.5               | 1.0                                      | 0.5   |
| CPAMW01     | PS03     | 2009 2nd Quarter |                 | 6/8/2009    | 6.75                     | 401.57                       | 3,300          | 17,000                   | 29,000                     | 1,800                      | 16,000                     | 46,800                       |                               | 0.25                     | 15                    | 1100              | 2.5                   | 28,000         | 0.95                    | 40.2     | 2.0               | 1.8                                      | 0.2   |
| CPAMW01     | PS03     | 2009 3rd Quarter |                 | 8/20/2009   | 9.82                     | 398.50                       | 5000           | 16000                    | 18000                      | 1,200                      | 11000                      | 30,200                       | 740                           | 0.025                    | 2.5                   | 1100              | 2.5                   | 32000          | 2.49                    | 12.2     | 1.5               | 1.5                                      | 0.0   |
| CPAMW01     | PS03     | 2009 4th Quarter |                 | 11/18/2009  | 7.90                     | 400.42                       | 6000           | 15000                    | 18000                      | 1,300                      | 11000                      | 30,300                       |                               | 0.025                    | 7.7                   | 1000              | 2.5                   | 32000          | 0.62                    | -197.2   | 1.3               | 1.2                                      | 0.1   |
| CPAMW01     | PS03     | 2010 1st Quarter |                 | 2/17/2010   | 8.21                     | 400.11                       | 7300           | 18000                    | 22000                      | 1,700                      | 14000                      | 37,700                       | 870                           | 0.025                    | 5.7                   | 1000              | 2.5                   | 23000          | 0.02                    | -66.6    | 1.2               | 1.0                                      | 0.2   |
| CPAMW01-DUP | PS03-DUP | 2006 3rd Quarter | PSMW3-0806-AD   | 8/31/2006   | 17.07                    | 391.25                       | 3,300          | 19,000                   | 27,000                     | 1,800                      | 15,000                     | 43,800                       | 1200                          | 0.25                     | 13                    | 1200              | 1.1                   | 21,000         |                         |          |                   |  |   |
| CPAMW01-DUP | PS03-DUP | 2007 2nd Quarter | PSMW3-0507-AD   | 5/29/2007   | 11.71                    | 396.61                       | 2,600          | 15,000                   | 23,000                     | 1,500                      | 13,000                     | 37,500                       | 1100                          |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW01-DUP | PS03-DUP | 2007 4th Quarter | PSMW03-1207-AD  | 12/17/2007  | 14.98                    | 393.34                       | 2,900          | 12,000                   | 20,000                     | 1,300                      | 11,000                     | 32,300                       | 1000                          |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW01-DUP | PS03-DUP | 2008 1st Quarter | PSMW03-0308-AD  | 3/25/2008   | 14.38                    | 393.94                       | 2,600          | 15,000                   | 16,000                     | 1,000                      | 8,100                      | 25,100                       | 1100                          |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW01-DUP | PS03-DUP | 2008 2nd Quarter | PSMW03-0608-AD  | 6/18/2008   | 5.93                     | 402.39                       | 3,600          | 18,000                   | 28,000                     | 1,700                      | 15,000                     | 44,700                       | 1200                          |                          |                       |                   |                       |                |                         |          |                   |  |   |



**ATTACHMENT A**  
Supporting Data for MNA Evalaution 3Q08 through 2Q10

| Location    | Point ID | Quarterly Effort | Sample ID     | Sample Date | Water Level (Depth, ft.) | Groundwater Eelvation (feet) | Benzene (ug/L) | Monochlorobenzene (ug/L) | 1,2-Dichlorobenzene (ug/L) | 1,3-Dichlorobenzene (ug/L) | 1,4-Dichlorobenzene (ug/L) | Total Dichlorobenzene (ug/L) | 1,2,4-Trichlorobenzene (ug/L) | Nitrogen, Nitrate (mg/L) | Sulfate as SO4 (mg/L) | Alkalinity (mg/L) | Carbon Dioxide (mg/L) | Methane (ug/L) | Dissolved Oxygen (mg/L) | ORP (mV) | Total Iron (mg/L) | Dissolved Iron (Fe <sup>2+</sup> , mg/L) | Total Iron - Fe <sup>2+</sup> (mg/L) Assumed to be Fe <sup>3+</sup> |
|-------------|----------|------------------|---------------|-------------|--------------------------|------------------------------|----------------|--------------------------|----------------------------|----------------------------|----------------------------|------------------------------|-------------------------------|--------------------------|-----------------------|-------------------|-----------------------|----------------|-------------------------|----------|-------------------|--|---|
| CPAMW02     | PS04     | 2006 1st Quarter | PSMW4-0306    | 3/23/2006   | 19.57                    | 388.63                       | 1,600          | 30,000                   | 1,200                      | 370                        | 8,400                      | 9,970                        | 4.75                          |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW02     | PS04     | 2006 2nd Quarter | PSMW4-0606    | 6/28/2006   | 16.53                    | 391.67                       | 2,200          | 32,000                   | 710                        | 350                        | 6,400                      | 7,460                        | 4.7                           |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW02     | PS04     | 2006 3rd Quarter | PSMW4-0806    | 8/30/2006   | 19.18                    | 389.02                       | 2,200          | 38,000                   | 750                        | 5                          | 8,600                      | 9,350                        | 4.7                           |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW02     | PS04     | 2006 4th Quarter | PSMW4-1106    | 11/28/2006  | 20.39                    | 387.81                       | 1,500          | 28,000                   | 440                        | 260                        | 5,700                      | 6,400                        | 25.5                          |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW02     | PS04     | 2007 1st Quarter | PSMW4-0207    | 2/27/2007   | 19.11                    | 389.09                       | 1,700          | 18,000                   | 550                        | 100                        | 3,600                      | 4,150                        | 5                             |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW02     | PS04     | 2007 2nd Quarter | PSMW4-0507    | 5/30/2007   | 11.63                    | 396.57                       | 7,400          | 33,000                   | 100                        | 100                        | 2,900                      | 2,900                        | 4.85                          |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW02     | PS04     | 2007 3rd Quarter | PSMW04-0907   | 9/25/2007   | 13.93                    | 394.27                       | 1,300          | 18,000                   | 300                        | 100                        | 4,000                      | 4,300                        | 50                            |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW02     | PS04     | 2007 4th Quarter | PSMW04-1207   | 12/17/2007  | 16.59                    | 391.61                       | 14,000         | 27,000                   | 910                        | 320                        | 7,700                      | 8,930                        | 4.7                           |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW02     | PS04     | 2008 1st Quarter | PSMW04-0308   | 3/24/2008   | 14.98                    | 393.22                       | 1,800          | 26,000                   | 310                        | 100                        | 3,400                      | 3,710                        | 4.7                           |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW02     | PS04     | 2008 2nd Quarter | PSMW04-0608   | 6/16/2008   | 5.82                     | 402.38                       | 730            | 31,000                   | 125                        | 125                        | 6,600                      | 6,600                        | 5                             |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW02     | PS04     | 2008 3rd Quarter |               | 8/26/2008   | 8.28                     | 399.92                       | 3,200          | 33,000                   | 500                        | 270                        | 9,100                      | 9,870                        |                               | 0.025                    | 2.5                   | 640               | 18                    | 7,400          | 6.46                    | -105.6   | 5.8               | 5.5                                      | 0.3   |
| CPAMW02     | PS04     | 2008 4th Quarter |               | 11/20/2008  | 12.54                    | 395.66                       | 2,000          | 33,000                   | 2,400                      | 640                        | 14,000                     | 17,040                       |                               | 0.025                    | 2.5                   | 620               | 40                    | 1,400          | 6.92                    | 104.8    | 5.3               | 5.1                                      | 0.2   |
| CPAMW02     | PS04     | 2009 1st Quarter |               | 3/2/2009    | 14.07                    | 394.13                       | 820            | 31,000                   | 3,000                      | 720                        | 17,000                     | 20,720                       | 4.85                          | 0.025                    | 2.5                   | 610               | 25                    | 2,800          | 13.43                   | -144     | 6.1               | 5.2                                      | 0.9   |
| CPAMW02     | PS04     | 2009 2nd Quarter |               | 6/8/2009    | 6.87                     | 401.33                       | 320            | 37,000                   | 420                        | 350                        | 11,000                     | 11,770                       |                               | 0.025                    | 2.5                   | 630               | 35                    | 7,200          | 1.66                    | -50.7    | 4.9               | 4.8                                      | 0.1   |
| CPAMW02     | PS04     | 2009 3rd Quarter |               | 8/20/2009   | 14.11                    | 394.09                       | 1,100          | 30000                    | 2,100                      | 600                        | 15,000                     | 17,700                       | 4.7                           | 0.025                    | 2.5                   | 630               | 13.5                  | 2800           | 4.39                    | -111     | 5.9               | 5.3                                      | 0.6   |
| CPAMW02     | PS04     | 2009 4th Quarter |               | 11/18/2009  | 8.26                     | 399.94                       | 710            | 26000                    | 1,800                      | 500                        | 13,000                     | 15,300                       | NA                            | 0.025                    | 2.5                   | 530               | 36                    | 2600           | 1.75                    | -125.6   | 6.1               | 5.7                                      | 0.4   |
| CPAMW02     | PS04     | 2010 1st Quarter |               | 2/17/2010   | 12.01                    | 396.19                       | 1,100          | 29,000                   | 2,700                      | 670                        | 16,000                     | 19,370                       | 4.85                          | 0.025                    | 2.5                   | 610               | 36                    | 2200           | 0.19                    | -122.9   | 6.1               | 6.0                                      | 0.1   |
| CPAMW02-DUP | PS04-DUP | 2006 1st Quarter | PSMW4-0306-AD | 3/23/2006   | 19.57                    | 388.63                       | 1,500          | 27,000                   | 1,400                      | 360                        | 8,100                      | 9,860                        | 4.8                           |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW03     | PS07     | 2006 1st Quarter | PSMW7-0306    | 3/20/2006   | 22.84                    | 387.83                       | 11,000         | 1,400                    | 97                         | 26                         | 550                        | 673                          | 4.7                           |                          |                       |                   |                       |                |                         |          |                   |  |   |
| CPAMW03     | PS07     | 2006 2nd Quarter | PSMW7-0606    | 6/26/2006   | 18.98                    | 391.69                       | 580            | 320                      | 2.5                        | 2.5                        | 2.5                        | 8                            | 4.7                           | 0.025                    | 2.5                   | 710               | 100                   | 17,000         | 0.75                    | -81.3    |                   |  |   |
| CPAMW03     | PS07     | 2006 3rd Quarter | PSMW7-0906    | 9/8/2006    | 22.81                    | 387.86                       | 500            | 520                      | 2.5                        | 2.5                        | 2.5                        | 8                            | 4.7                           | 0.025                    | 2.5                   | 700               | 160                   | 20,000         | 0.52                    | -136.7   |                   |  |   |
| CPAMW03     | PS07     | 2006 4th Quarter | PSMW7-1106    | 11/27/2006  | 28.92                    | 381.75                       | 3,500          | 680                      | 25                         | 25                         | 25                         | 75                           | 5                             | 0.025                    | 2.5                   | 930               | 43                    | 19,000         | 0.61                    | -106.5   |                   |  |   |
| CPAMW03     | PS07     | 2007 1st Quarter | PSMW7-0207    | 2/22/2007   | 27.37                    | 383.30                       | 240            | 370                      | 2.5                        | 2.5                        | 2.5                        | 8                            | 4.8                           | 0.083                    | 12.5                  | 710               | 36                    | 16,000         | 0.31                    | -80.6    |                   |  |   |
| CPAMW03     | PS07     | 2007 2nd Quarter | PSMW7-0507    | 5/24/2007   | 17.25                    | 393.42                       | 55             | 310                      | 12                         | 3                          | 12                         | 24                           | 4.7                           | 0.025                    | 2.5                   | 730               | 51                    | 9,100          | 0.81                    | -133.9   | 14.0              | 14.0                                     | 0.0   |
| CPAMW03     | PS07     | 2007 3rd Quarter | PSMW07-0907   | 9/20/2007   | 20.78                    | 389.89                       | 38             | 480                      | 3                          | 3                          | 3                          | 0                            | 4.7                           | 0.025                    | 2.5                   | 720               | 52                    | 17,000         | 0.21                    | -102.3   | 16.0              | 16.0                                     | 0.0   |
| CPAMW03     | PS07     | 2007 4th Quarter | PSMW07-1207   | 12/12/2007  | 24.68                    | 385.99                       | 26             | 420                      | 6                          | 3                          | 8                          | 14                           | 4.7                           | 0.025                    | 2.5                   | 720               | 37                    | 17,000         | 0.89                    | -20.2    | 13.0              | 15.0                                     | 0.0   |
| CPAMW03     | PS07     | 2008 1st Quarter | PSMW07-0308   | 3/19/2008   | 21.55                    | 389.12                       | 25             | 430                      | 3                          | 3                          | 3                          | 8                            | 4.7                           | 0.025                    | 2.5                   | 700               | 71                    | 17,000         | 1.8                     | 16.3     | 15.0              | 15.0                                     | 0.0   |
| CPAMW03     | PS07     | 2008 2nd Quarter | PSMW07-0608   | 6/17/2008   | 5.27                     | 405.40                       | 24             | 490                      | 7                          | 3                          | 12                         | 19                           | 4.85                          | 0.025                    | 2.5                   | 720               | 77                    | 21,000         | 0.34                    | -138     | 17.0              | 16.0                                     | 1.0   |
| CPAMW03     | PS07     | 2008 3rd Quarter |               | 8/21/2008   | 10.80                    | 399.87                       | 25             | 460                      | 4                          | 2                          | 6                          | 11                           |                               | 0.025                    | 12.5                  | 690               | 48                    | 8,800          | 0.29                    | 1.9      | 18.0              | 18.0                                     | 0.0   |
| CPAMW03     | PS07     | 2008 4th Quarter |               | 11/24/2008  | 15.44                    | 395.23                       | 53             | 420                      | 13                         | 1                          | 16                         | 30                           |                               | 0.025                    | 2.5                   | 690               | 56                    | 33,000         | 6.09                    | -87      | 15.0              | 15.0                                     | 0.0   |
| CPAMW03     | PS07     | 2009 1st Quarter |               | 2/26/2009   | 16.75                    | 393.92                       | 86             | 460                      | 11                         | 3                          | 16                         | 27                           | 4.7                           | 0.025                    | 2.5                   | 690               | 49                    | 30,000         | 6.15                    | -150.8   | 13.0              | 14.0                                     | 0.0   |
| CPAMW03     | PS07     | 2009 2nd Quarter |               | 6/3/2009    | 7.35                     | 403.32                       | 27             | 500                      | 6                          | 3                          | 9                          | 17                           |                               | 0.025                    | 0.025                 | 710               | 59                    | 31,000         | 0.56                    | -104.5   | 15.0              | 15.0                                     | 0.0   |
| CPAMW03     | PS07     | 2009 3rd Quarter |               | 8/19/2009   | 14.64                    | 396.03                       | 44             | 510                      | 12                         | 1                          | 17                         | 30                           | 4.7                           | 0.025                    | 2.5                   | 690               | 28                    | 32000          | 3.66                    | -137.2   | 14.0              | 14.0                                     | 0.0   |
| CPAMW03     | PS08     | 2009 4th Quarter |               | 11/17/2009  | 9.59                     | 401.08                       | 3              | 520                      | 13                         | 2.5                        | 20                         | 33                           |                               | 0.025                    | 2.5                   | 640               | 79                    | 36000          | 1.57                    | -131.4   | 16.0              | 16.0                                     | 0.0   |
| CPAMW03     | PS09     | 2010 1st Quarter |               | 2/18/2010   | 12.01                    | 398.66                       | 180            | 660                      | 37                         | 5                          | 64                         | 106                          | 5                             | 0.025                    | 2.5                   | 660               | 63                    | 26000          | 0.09                    | -137.9   | 15.0              | 14.0                                     | 1.0   |



## **Attachment B**

**ATTACHMENT B**  
**Mann-Kendall Analysis of MNA Data 3Q08 through 2Q10**  
**Monitoring Well BSA-MW-1**

| State of Wisconsin<br>Department of Natural Resources<br>Remediation and Redevelopment Program  |                                     |  | Mann-Kendall Statistical Test<br>Form 4400-215 (2/2001) |  |  |  |  |
|---|-------------------------------------|--|---|--|--|--|--|
| <b>Notice:</b> This form is the DNR supplied spreadsheet referenced in Appendices A of Comm 46 and NR 746, Wis. Adm. Code. It is provided to consultants as an optional tool for groundwater contaminant trend analysis to support site closure requests under s. Comm 46.07, Comm 46.08, NR 746.07, NR 746.08, Wis. Adm. Code. Use this form or a manual method when seeking case closure under those rules. Earlier versions of this form should not be used.   |                                     |  |   |  |  |  |  |
| <b>Instructions:</b> Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values. |                                     |  |   |  |  |  |  |
| Site Name = Solutia W GK Site   |                                     |  | BRRTS No. =   |  | Well Number = BSAMW01                                  |  |  |
|   | Compound ->                         | Benzene  | Mono-chlorobenzene                                      | 1,2-DCB  | 1,3-DCB  | 1,4-DCB  | Total DCB  |
|   |                                     | Concentration<br>(blank if no data;<br>Red if ND used) | Concentration<br>(blank if no data;<br>Red if ND used)  | Concentration<br>(blank if no data;<br>Red if ND used) | Concentration<br>(blank if no data;<br>Red if ND used) | Concentration<br>(blank if no data;<br>Red if ND used) | Concentration<br>(blank if no data;<br>Red if ND used) |
| Event Number  | Sampling Date<br>(most recent last) |  |   |  |  |  |  |
| 1   | 26-Aug-08                           | 1,000,000  |   |  |  |  |  |
| 2   | 20-Nov-08                           | 1,200,000  |   |  |  |  |  |
| 3   | 2-Mar-09                            | 830,000  |   |  |  |  |  |
| 4   | 19-Aug-09                           | 940,000  |   |  |  |  |  |
| 5   | 18-Feb-10                           | 730,000  |   |  |  |  |  |
| 6   |                                     |  |   |  |  |  |  |
| 7   |                                     |  |   |  |  |  |  |
| 8   |                                     |  |   |  |  |  |  |
| 9   |                                     |  |   |  |  |  |  |
| 10  |                                     |  |   |  |  |  |  |
| Mann Kendall Statistic (S) =  |                                     | -6.0   | 0.0   | 0.0  | 0.0  | 0.0  | 0.0  |
| Number of Rounds (n) =  |                                     | 5  | 0   | 0  | 0  | 0  | 0  |
| Average =   |                                     | 940000.00  | #DIV/0!   | #DIV/0!  | #DIV/0!  | #DIV/0!  | #DIV/0!  |
| Standard Deviation =  |                                     | 178465.683   | #DIV/0!   | #DIV/0!  | #DIV/0!  | #DIV/0!  | #DIV/0!  |
| Coefficient of Variation(CV)=   |                                     | 0.190  | #DIV/0!   | #DIV/0!  | #DIV/0!  | #DIV/0!  | #DIV/0!  |
| Error Check, Blank if No Errors Detected  |                                     |  | n<4   | n<4  | n<4  | n<4  | n<4  |
| Trend ≥ 80% Confidence Level  |                                     | DECREASING   | n<4   | n<4  | n<4  | n<4  | n<4  |
| Trend ≥ 90% Confidence Level  |                                     | No Trend   | n<4   | n<4  | n<4  | n<4  | n<4  |
| Trend ≥ 95% Confidence Level  |                                     | No Trend   | n<4   | n<4  | n<4  | n<4  | n<4  |
| Stability Test, If No Trend Exists at 80% Confidence Level  |                                     | NA   | n<4   | n<4  | n<4  | n<4  | n<4  |
| Data Entry By = PWS   |                                     |  | Date = 16-Jul-10  |  | Checked By = WAN                                       |  |  |



**ATTACHMENT B**  
**Mann-Kendall Analysis of MNA Data 3Q08 through 2Q10**  
**Monitoring Well BSA-MW-2**

| <b>State of Wisconsin</b><br><b>Department of Natural Resources</b><br><b>Remediation and Redevelopment Program</b>   |                                     |  |  | <b>Mann-Kendall Statistical Test</b><br><b>Form 4400-215 (2/2001)</b><br><b>Revised to Evaluate Trend at ≥ 95% Confidence Level</b> |  |  |  |
|---|-------------------------------------|--|--|---|--|--|--|
| <b>Notice:</b> This form is the DNR supplied spreadsheet referenced in Appendices A of Comm 46 and NR 746, Wis. Adm. Code. It is provided to consultants as an optional tool for groundwater contaminant trend analysis to support site closure requests under s. Comm 46.07, Comm 46.08, NR 746.07, NR 746.08, Wis. Adm. Code. Use this form or a manual method when seeking case closure under those rules. Earlier versions of this form should not be used.   |                                     |  |  |   |  |  |  |
| <b>Instructions:</b> Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values. |                                     |  |  |   |  |  |  |
| Site Name = Solutia W GK Site   |                                     |  | BRRTS No. =  |   | Well Number =  |  | BSAMW02  |
| Compound ->   |                                     | Benzene  | Mono-chlorobenzene                                     | 1,2-DCB   | 1,3-DCB  | 1,4-DCB  | Total DCB  |
| Event Number  | Sampling Date<br>(most recent last) | Concentration<br>(blank if no data;<br>Red if ND used) | Concentration<br>(blank if no data;<br>Red if ND used) | Concentration<br>(blank if no data;<br>Red if ND used)  | Concentration<br>(blank if no data;<br>Red if ND used) | Concentration<br>(blank if no data;<br>Red if ND used) | Concentration<br>(blank if no data;<br>Red if ND used) |
| 1   | 21-Aug-08                           | 18,000   | 1,700  |   |  |  |  |
| 2   | 24-Nov-08                           | 16,000   | 2,500  |   |  |  |  |
| 3   | 26-Feb-09                           | 20,000   | 2,900  |   |  |  |  |
| 4   | 19-Aug-09                           | 7,200  | 5,000  |   |  |  |  |
| 5   | 17-Feb-10                           | 150,000  | 2,700  |   |  |  |  |
| 6   |                                     |  |  |   |  |  |  |
| 7   |                                     |  |  |   |  |  |  |
| 8   |                                     |  |  |   |  |  |  |
| 9   |                                     |  |  |   |  |  |  |
| 10  |                                     |  |  |   |  |  |  |
| Mann Kendall Statistic (S) =  |                                     | 2.0  | 6.0  | 0.0   | 0.0  | 0.0  | 0.0  |
| Number of Rounds (n) =  |                                     | 5  | 5  | 0   | 0  | 0  | 0  |
| Average =   |                                     | 42240.00   | 2960.00  | #DIV/0!   | #DIV/0!  | #DIV/0!  | #DIV/0!  |
| Standard Deviation =  |                                     | 60437.472  | 1228.007   | #DIV/0!   | #DIV/0!  | #DIV/0!  | #DIV/0!  |
| Coefficient of Variation(CV)=   |                                     | 1.431  | 0.415  | #DIV/0!   | #DIV/0!  | #DIV/0!  | #DIV/0!  |
| Error Check, Blank if No Errors Detected  |                                     |  |  | n<4   | n<4  | n<4  | n<4  |
| Trend ≥ 80% Confidence Level  |                                     | No Trend   | INCREASING   | n<4   | n<4  | n<4  | n<4  |
| Trend ≥ 90% Confidence Level  |                                     | No Trend   | No Trend   | n<4   | n<4  | n<4  | n<4  |
| Trend ≥ 95% Confidence Level  |                                     | No Trend   | No Trend   | n<4   | n<4  | n<4  | n<4  |
| Stability Test, If No Trend Exists at 80% Confidence Level  |                                     | CV > 1<br>NON-STABLE                                   | NA   | n<4<br>n<4  | n<4<br>n<4   | n<4<br>n<4   | n<4<br>n<4   |
| Data Entry By = PWS   |                                     |  | Date = 16-Jul-10                                       |   | Checked By = WAN                                       |  |  |



**ATTACHMENT B**  
**Mann-Kendall Analysis of MNA Data 3Q08 through 2Q10**  
**Monitoring Well BSA-MW-3**

| State of Wisconsin<br>Department of Natural Resources<br>Remediation and Redevelopment Program  |                                       |                                       |                                       | Mann-Kendall Statistical Test<br>Form 4400-215 (2/2001) |                                       |                                       |            |
|---|---------------------------------------|---------------------------------------|---------------------------------------|---|---------------------------------------|---------------------------------------|------------|
| <p><b>Notice:</b> This form is the DNR supplied spreadsheet referenced in Appendices A of Comm 46 and NR 746, Wis. Adm. Code. It is provided to consultants as an optional tool for groundwater contaminant trend analysis to support site closure requests under s. Comm 46.07, Comm 46.08, NR 746.07, NR 746.08, Wis. Adm. Code. Use this form or a manual method when seeking case closure under those rules. Earlier versions of this form should not be used.</p> <p><b>Instructions:</b> Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values.</p> |                                       |                                       |                                       |   |                                       |                                       |            |
| Site Name = Solutia W GK Site   |                                       |                                       |                                       | BRRTS No. =   |                                       | Well Number = BSAMW03                 |            |
| Compound ->   | Benzene                               | Mono-chlorobenzene                    | 1,2-DCB                               | 1,3-DCB   | 1,4-DCB                               | Total DCB                             |            |
| Concentration   | Concentration                         | Concentration                         | Concentration                         | Concentration   | Concentration                         | Concentration                         |            |
| (blank if no data;<br>Red if ND used)   | (blank if no data;<br>Red if ND used) | (blank if no data;<br>Red if ND used) | (blank if no data;<br>Red if ND used) | (blank if no data;<br>Red if ND used)                   | (blank if no data;<br>Red if ND used) | (blank if no data;<br>Red if ND used) |            |
| Event Number  | Sampling Date<br>(most recent last)   |                                       |                                       |   |                                       |                                       |            |
| 1   | 25-Aug-08                             | 30                                    | 1,500                                 | 14  | 3,400                                 | 30                                    | 3,444      |
| 2   | 21-Nov-08                             | 97                                    | 1,300                                 | 22  | 440                                   | 97                                    | 559        |
| 3   | 2-Mar-09                              | 120                                   | 1,200                                 | 14  | 370                                   | 120                                   | 504        |
| 4   | 19-Aug-09                             | 68                                    | 1,100                                 | 32  | 20                                    | 330                                   | 382        |
| 5   | 16-Feb-10                             | 87                                    | 1,200                                 | 46  | 20                                    | 430                                   | 496        |
| 6   |                                       |                                       |                                       |   |                                       |                                       |            |
| 7   |                                       |                                       |                                       |   |                                       |                                       |            |
| 8   |                                       |                                       |                                       |   |                                       |                                       |            |
| 9   |                                       |                                       |                                       |   |                                       |                                       |            |
| 10  |                                       |                                       |                                       |   |                                       |                                       |            |
| Mann Kendall Statistic (S) =  |                                       | 2.0                                   | -7.0                                  | 7.0   | -9.0                                  | 10.0                                  | -8.0       |
| Number of Rounds (n) =  |                                       | 5                                     | 5                                     | 5   | 5                                     | 5                                     | 5          |
| Average =   |                                       | 80.40                                 | 1260.00                               | 25.60   | 850.00                                | 201.40                                | 1077.00    |
| Standard Deviation =  |                                       | 33.842                                | 151.658                               | 13.594  | 1438.645                              | 170.073                               | 1324.757   |
| Coefficient of Variation(CV)=   |                                       | 0.421                                 | 0.120                                 | 0.531   | 1.693                                 | 0.844                                 | 1.230      |
| Error Check, Blank if No Errors Detected  |                                       |                                       |                                       |   |                                       |                                       |            |
| Trend ≥ 80% Confidence Level  |                                       | No Trend                              | DECREASING                            | INCREASING  | DECREASING                            | INCREASING                            | DECREASING |
| Trend ≥ 90% Confidence Level  |                                       | No Trend                              | DECREASING                            | INCREASING  | DECREASING                            | INCREASING                            | DECREASING |
| Trend ≥ 95% Confidence Level  |                                       | No Trend                              | No Trend                              | No Trend  | DECREASING                            | INCREASING                            | DECREASING |
| Stability Test, If No Trend Exists at 80% Confidence Level  |                                       | CV ≤ 1<br>STABLE                      | NA                                    | NA  | NA                                    | NA                                    | NA         |
| Data Entry By =   |                                       | PWS                                   | Date =                                | 16-Jul-10   | Checked By =                          | WAN                                   |            |



**ATTACHMENT B**  
**Mann-Kendall Analysis of MNA Data 3Q08 through 2Q10**  
**Monitoring Well BSA-MW-4**

| State of Wisconsin<br>Department of Natural Resources<br>Remediation and Redevelopment Program  |                                     |  |  | Mann-Kendall Statistical Test<br>Form 4400-215 (2/2001) |  |  |  |
|---|-------------------------------------|--|--|---|--|--|--|
| <p><b>Notice:</b> This form is the DNR supplied spreadsheet referenced in Appendices A of Comm 46 and NR 746, Wis. Adm. Code. It is provided to consultants as an optional tool for groundwater contaminant trend analysis to support site closure requests under s. Comm 46.07, Comm 46.08, NR 746.07, NR 746.08, Wis. Adm. Code. Use this form or a manual method when seeking case closure under those rules. Earlier versions of this form should not be used.</p> <p><b>Instructions:</b> Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values.</p> |                                     |  |  |   |  |  |  |
| Site Name = Solutia W GK Site   |                                     |  |  | BRRTS No. =   |  | Well Number = BSAMW04                                  |  |
| Compound ->   |                                     | Benzene  | Mono-chlorobenzene                                     | 1,2-DCB   | 1,3-DCB  | 1,4-DCB  | Total DCB  |
| Event Number  | Sampling Date<br>(most recent last) | Concentration<br>(blank if no data;<br>Red if ND used) | Concentration<br>(blank if no data;<br>Red if ND used) | Concentration<br>(blank if no data;<br>Red if ND used)  | Concentration<br>(blank if no data;<br>Red if ND used) | Concentration<br>(blank if no data;<br>Red if ND used) | Concentration<br>(blank if no data;<br>Red if ND used) |
| 1   | 25-Aug-08                           | 48   | 2,600  | 13  | 20   | 49   | 67   |
| 2   | 20-Nov-08                           | 590  | 2,300  | 37  | 20   | 73   | 130  |
| 3   | 25-Feb-09                           | 82   | 2,300  | 26  | 20   | 64   | 110  |
| 4   | 18-Aug-09                           | 99   | 2,700  | 20  | 26   | 61   | 107  |
| 5   | 16-Feb-10                           | 73   | 2,700  | 22  | 20   | 68   | 110  |
| 6   |                                     |  |  |   |  |  |  |
| 7   |                                     |  |  |   |  |  |  |
| 8   |                                     |  |  |   |  |  |  |
| 9   |                                     |  |  |   |  |  |  |
| 10  |                                     |  |  |   |  |  |  |
| Mann Kendall Statistic (S) =  |                                     | 0.0  | 4.0  | 0.0   | 2.0  | 2.0  | 1.0  |
| Number of Rounds (n) =  |                                     | 5  | 5  | 5   | 5  | 5  | 5  |
| Average =   |                                     | 178.40   | 2520.00  | 23.60   | 21.20  | 63.00  | 104.80   |
| Standard Deviation =  |                                     | 230.827  | 204.939  | 8.849   | 2.683  | 9.028  | 23.037   |
| Coefficient of Variation(CV)=   |                                     | 1.294  | 0.081  | 0.375   | 0.127  | 0.143  | 0.220  |
| Error Check, Blank if No Errors Detected  |                                     |  |  |   |  |  |  |
| Trend ≥ 80% Confidence Level  |                                     | No Trend   | No Trend   | No Trend  | No Trend   | No Trend   | No Trend   |
| Trend ≥ 90% Confidence Level  |                                     | No Trend   | No Trend   | No Trend  | No Trend   | No Trend   | No Trend   |
| Trend ≥ 95% Confidence Level  |                                     | No Trend   | No Trend   | No Trend  | No Trend   | No Trend   | No Trend   |
| Stability Test, If No Trend Exists at 80% Confidence Level  |                                     | CV > 1<br>NON-STABLE                                   | CV ≤ 1<br>STABLE                                       | CV ≤ 1<br>STABLE  | CV ≤ 1<br>STABLE                                       | CV ≤ 1<br>STABLE                                       | CV ≤ 1<br>STABLE                                       |
| Data Entry By = PWS   |                                     | Date = 16-Jul-10                                       |  | Checked By = WAN  |  |  |  |



**ATTACHMENT B**  
**Mann-Kendall Analysis of MNA Data 3Q08 through 2Q10**  
**Monitoring Well BSA-MW-5**

| State of Wisconsin<br>Department of Natural Resources<br>Remediation and Redevelopment Program   |                                     |  |  | Mann-Kendall Statistical Test<br>Form 4400-215 (2/2001)<br>Revised to Evaluate Trend at $\geq 95\%$ Confidence Level |  |  |  |
|--|-------------------------------------|--|--|--|--|--|--|
| <b>Notice:</b> This form is the DNR supplied spreadsheet referenced in Appendices A of Comm 46 and NR 746, Wis. Adm. Code. It is provided to consultants as an optional tool for groundwater contaminant trend analysis to support site closure requests under s. Comm 46.07, Comm 46.08, NR 746.07, NR 746.08, Wis. Adm. Code. Use this form or a manual method when seeking case closure under those rules. Earlier versions of this form should not be used.<br><b>Instructions:</b> Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values. |                                     |  |  |  |  |  |  |
| Site Name = Solutia W GK Site  |                                     |  | BRRTS No. =  |  | Well Number = BSAMW05                                  |  |  |
| Compound ->  | Benzene                             | Mono-chlorobenzene                                     | 1,2-DCB  | 1,3-DCB  | 1,4-DCB  | Total DCB  |  |
| Event Number   | Sampling Date<br>(most recent last) | Concentration<br>(blank if no data;<br>Red if ND used) | Concentration<br>(blank if no data;<br>Red if ND used) | Concentration<br>(blank if no data;<br>Red if ND used)   | Concentration<br>(blank if no data;<br>Red if ND used) | Concentration<br>(blank if no data;<br>Red if ND used) | Concentration<br>(blank if no data;<br>Red if ND used) |
| 1  | 20-Aug-08                           | 18   | 300  | 4  | 4  | 5  | 13   |
| 2  | 21-Nov-08                           | 130  | 310  | 19   | 4  | 20   | 43   |
| 3  | 26-Aug-09                           | 13   | 330  | 10   | 4  | 13   | 27   |
| 4  | 15-Feb-10                           | 5  | 350  | 190  | 16   | 140  | 346  |
| 5  |                                     |  |  |  |  |  |  |
| 6  |                                     |  |  |  |  |  |  |
| 7  |                                     |  |  |  |  |  |  |
| 8  |                                     |  |  |  |  |  |  |
| 9  |                                     |  |  |  |  |  |  |
| 10   |                                     |  |  |  |  |  |  |
| Mann Kendall Statistic (S) =   |                                     | -4.0   | 6.0  | 4.0  | 3.0  | 4.0  | 4.0  |
| Number of Rounds (n) =   |                                     | 4  | 4  | 4  | 4  | 4  | 4  |
| Average =  |                                     | 41.50  | 322.50   | 55.75  | 7.00   | 44.53  | 107.28   |
| Standard Deviation =   |                                     | 59.242   | 22.174   | 89.712   | 6.000  | 63.940   | 159.618  |
| Coefficient of Variation(CV)=  |                                     | 1.428  | 0.069  | 1.609  | 0.857  | 1.436  | 1.488  |
| Error Check, Blank if No Errors Detected   |                                     |  |  |  |  |  |  |
| Trend $\geq 80\%$ Confidence Level   |                                     | DECREASING   | INCREASING   | INCREASING   | No Trend   | INCREASING   | INCREASING   |
| Trend $\geq 90\%$ Confidence Level   |                                     | No Trend   | INCREASING   | No Trend   | No Trend   | No Trend   | No Trend   |
| Trend $\geq 95\%$ Confidence Level   |                                     | No Trend   | INCREASING   | No Trend   | No Trend   | No Trend   | No Trend   |
| Stability Test, If No Trend Exists at 80% Confidence Level   |                                     | NA   | NA   | NA   | CV $\leq 1$<br>STABLE                                  | NA   | NA   |
| Data Entry By = PWS  |                                     |  | Date = 16-Jul-10                                       |  | Checked By = WAN                                       |  |  |



**ATTACHMENT B**  
**Mann-Kendall Analysis of MNA Data 3Q08 through 2Q10**  
**Monitoring Well CPA-MW-1**

| State of Wisconsin<br>Department of Natural Resources<br>Remediation and Redevelopment Program  |  |   | Mann-Kendall Statistical Test<br>Form 4400-215 (2/2001)                      |   |   |   |   |
|---|--|---|--|---|---|---|---|
| <p><b>Notice:</b> This form is the DNR supplied spreadsheet referenced in Appendices A of Comm 46 and NR 746, Wis. Adm. Code. It is provided to consultants as an optional tool for groundwater contaminant trend analysis to support site closure requests under s. Comm 46.07, Comm 46.08, NR 746.07, NR 746.08, Wis. Adm. Code. Use this form or a manual method when seeking case closure under those rules. Earlier versions of this form should not be used.</p> <p><b>Instructions:</b> Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values.</p> |  |   |  |   |   |   |   |
| Site Name = Solutia W GK Site   |  |   | BRRTS No. =  |   | Well Number = CPAMW01   |   |   |
| Event Number  | Compound -><br>Sampling Date<br>(most recent last) | Benzene<br>Concentration<br>(blank if no data;<br>Red if ND used) | Mono-chlorobenzene<br>Concentration<br>(blank if no data;<br>Red if ND used) | 1,2-DCB<br>Concentration<br>(blank if no data;<br>Red if ND used) | 1,3-DCB<br>Concentration<br>(blank if no data;<br>Red if ND used) | 1,4-DCB<br>Concentration<br>(blank if no data;<br>Red if ND used) | Total DCB<br>Concentration<br>(blank if no data;<br>Red if ND used) |
| 1   | 26-Aug-08  | 3,100   | 15,000   | 22,000  | 1,400   | 12,000  | 35,400  |
| 2   | 20-Nov-08  | 3,200   | 13,000   | 22,000  | 1,400   | 12,000  | 35,400  |
| 3   | 2-Mar-09   | 4,200   | 16,000   | 20,000  | 1,400   | 12,000  | 33,400  |
| 4   | 20-Aug-09  | 5,000   | 16,000   | 18,000  | 1,200   | 11,000  | 30,200  |
| 5   | 17-Feb-10  | 7,300   | 18,000   | 22,000  | 1,700   | 14,000  | 37,700  |
| 6   |  |   |  |   |   |   |   |
| 7   |  |   |  |   |   |   |   |
| 8   |  |   |  |   |   |   |   |
| 9   |  |   |  |   |   |   |   |
| 10  |  |   |  |   |   |   |   |
| Mann Kendall Statistic (S) =  |  | 10.0  | 7.0  | -3.0  | 1.0   | 1.0   | -1.0  |
| Number of Rounds (n) =  |  | 5   | 5  | 5   | 5   | 5   | 5   |
| Average =   |  | 4560.00   | 15600.00   | 20800.00  | 1420.00   | 12200.00  | 34420.00  |
| Standard Deviation =  |  | 1718.430  | 1816.590   | 1788.854  | 178.885   | 1095.445  | 2807.490  |
| Coefficient of Variation(CV)=   |  | 0.377   | 0.116  | 0.086   | 0.126   | 0.090   | 0.082   |
| Error Check, Blank if No Errors Detected  |  |   |  |   |   |   |   |
| Trend ≥ 80% Confidence Level  |  | INCREASING  | INCREASING   | No Trend  | No Trend  | No Trend  | No Trend  |
| Trend ≥ 90% Confidence Level  |  | INCREASING  | INCREASING   | No Trend  | No Trend  | No Trend  | No Trend  |
| Trend ≥ 95% Confidence Level  |  | INCREASING  | No Trend   | No Trend  | No Trend  | No Trend  | No Trend  |
| Stability Test, If No Trend Exists at 80% Confidence Level  |  | NA  | NA   | CV ≤ 1<br>STABLE  | CV ≤ 1<br>STABLE  | CV ≤ 1<br>STABLE  | CV ≤ 1<br>STABLE  |
| Data Entry By = PWS   |  | Date = 16-Jul-10  |  | Checked By = WAN  |   |   |   |



**ATTACHMENT B**  
**Mann-Kendall Analysis of MNA Data 3Q08 through 2Q10**  
**Monitoring Well CPA-MW-2**

| State of Wisconsin<br>Department of Natural Resources<br>Remediation and Redevelopment Program  |                                     |  |  | Mann-Kendall Statistical Test<br>Form 4400-215 (2/2001)<br>Revised to Evaluate Trend at $\geq 95\%$ Confidence Level |   |   |   |
|---|-------------------------------------|--|--|--|---|---|---|
| <b>Notice:</b> This form is the DNR supplied spreadsheet referenced in Appendices A of Comm 46 and NR 746, Wis. Adm. Code. It is provided to consultants as an optional tool for groundwater contaminant trend analysis to support site closure requests under s. Comm 46.07, Comm 46.08, NR 746.07, NR 746.08, Wis. Adm. Code. Use this form or a manual method when seeking case closure under those rules. Earlier versions of this form should not be used.   |                                     |  |  |  |   |   |   |
| <b>Instructions:</b> Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values. |                                     |  |  |  |   |   |   |
| Site Name = Solutia WGK Site  |                                     |  |  | BRRTS No. =  |   | Well Number = CPAMW02   |   |
| Event Number  | Sampling Date<br>(most recent last) | Compound -><br>Benzene<br>Concentration<br>(blank if no data;<br>Red if ND used) | Mono-chlorobenzene<br>Concentration<br>(blank if no data;<br>Red if ND used) | 1,2-DCB<br>Concentration<br>(blank if no data;<br>Red if ND used)  | 1,3-DCB<br>Concentration<br>(blank if no data;<br>Red if ND used) | 1,4-DCB<br>Concentration<br>(blank if no data;<br>Red if ND used) | Total DCB<br>Concentration<br>(blank if no data;<br>Red if ND used) |
| 1   | 26-Aug-08                           | 3,200  | 33,000   | 500  | 270   | 9,100   | 9,870   |
| 2   | 20-Nov-08                           | 2,000  | 33,000   | 2,400  | 640   | 14,000  | 17,040  |
| 3   | 2-Mar-09                            | 820  | 31,000   | 3,000  | 720   | 17,000  | 20,720  |
| 4   | 20-Aug-09                           | 1,100  | 30,000   | 2,100  | 600   | 15,000  | 17,700  |
| 5   | 17-Feb-10                           | 1,100  | 29,000   | 2,700  | 670   | 16,000  | 19,370  |
| 6   |                                     |  |  |  |   |   |   |
| 7   |                                     |  |  |  |   |   |   |
| 8   |                                     |  |  |  |   |   |   |
| 9   |                                     |  |  |  |   |   |   |
| 10  |                                     |  |  |  |   |   |   |
| Mann Kendall Statistic (S) =  |                                     | -5.0   | -9.0   | 4.0  | 4.0   | 6.0   | 6.0   |
| Number of Rounds (n) =  |                                     | 5  | 5  | 5  | 5   | 5   | 5   |
| Average =   |                                     | 1644.00  | 31200.00   | 2140.00  | 580.00  | 14220.00  | 16940.00  |
| Standard Deviation =  |                                     | 977.077  | 1788.854   | 976.217  | 178.746   | 3072.784  | 4206.121  |
| Coefficient of Variation(CV)=   |                                     | 0.594  | 0.057  | 0.456  | 0.308   | 0.216   | 0.248   |
| Error Check, Blank if No Errors Detected  |                                     |  |  |  |   |   |   |
| Trend $\geq 80\%$ Confidence Level  |                                     | DECREASING   | DECREASING   | No Trend   | No Trend  | INCREASING  | INCREASING  |
| Trend $\geq 90\%$ Confidence Level  |                                     | No Trend   | DECREASING   | No Trend   | No Trend  | No Trend  | No Trend  |
| Trend $\geq 95\%$ Confidence Level  |                                     | No Trend   | DECREASING   | No Trend   | No Trend  | No Trend  | No Trend  |
| Stability Test, If No Trend Exists at 80% Confidence Level  |                                     | NA   | NA   | CV $\leq 1$<br>STABLE  | CV $\leq 1$<br>STABLE   | NA  | NA  |
| Data Entry By =   |                                     | PWS  |  | Date =   | 16-Jul-10   |   | Checked By = WAN  |



**ATTACHMENT B**  
**Mann-Kendall Analysis of MNA Data 3Q08 through 2Q10**  
**Monitoring Well CPA-MW-3**

| State of Wisconsin<br>Department of Natural Resources<br>Remediation and Redevelopment Program  |                                     |  | Mann-Kendall Statistical Test<br>Form 4400-215 (2/2001)                      |   |   |   |   |
|---|-------------------------------------|--|--|---|---|---|---|
| <p><b>Notice:</b> This form is the DNR supplied spreadsheet referenced in Appendices A of Comm 46 and NR 746, Wis. Adm. Code. It is provided to consultants as an optional tool for groundwater contaminant trend analysis to support site closure requests under s. Comm 46.07, Comm 46.08, NR 746.07, NR 746.08, Wis. Adm. Code. Use this form or a manual method when seeking case closure under those rules. Earlier versions of this form should not be used.</p> <p><b>Instructions:</b> Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values.</p> |                                     |  |  |   |   |   |   |
| Site Name = Solutia W GK Site   |                                     |  | BRRTS No. =  |   | Well Number = CPAMW03   |   |   |
| Event Number  | Sampling Date<br>(most recent last) | Compound -><br>Benzene<br>Concentration<br>(blank if no data;<br>Red if ND used) | Mono-chlorobenzene<br>Concentration<br>(blank if no data;<br>Red if ND used) | 1,2-DCB<br>Concentration<br>(blank if no data;<br>Red if ND used) | 1,3-DCB<br>Concentration<br>(blank if no data;<br>Red if ND used) | 1,4-DCB<br>Concentration<br>(blank if no data;<br>Red if ND used) | Total DCB<br>Concentration<br>(blank if no data;<br>Red if ND used) |
| 1   | 21-Aug-08                           | 25   | 460  | 4   | 4   | 6   | 11  |
| 2   | 24-Nov-08                           | 53   | 420  | 13  | 1   | 16  | 30  |
| 3   | 26-Feb-09                           | 86   | 460  | 11  | 5   | 16  | 32  |
| 4   | 19-Aug-09                           | 44   | 510  | 10  | 1   | 17  | 28  |
| 5   | 18-Feb-10                           | 180  | 660  | 37  | 5   | 64  | 106   |
| 6   |                                     |  |  |   |   |   |   |
| 7   |                                     |  |  |   |   |   |   |
| 8   |                                     |  |  |   |   |   |   |
| 9   |                                     |  |  |   |   |   |   |
| 10  |                                     |  |  |   |   |   |   |
| Mann Kendall Statistic (S) =  |                                     | 6.0  | 7.0  | 4.0   | 1.0   | 9.0   | 6.0   |
| Number of Rounds (n) =  |                                     | 5  | 5  | 5   | 5   | 5   | 5   |
| Average =   |                                     | 77.60  | 502.00   | 15.04   | 3.22  | 23.88   | 41.34   |
| Standard Deviation =  |                                     | 61.354   | 93.915   | 12.705  | 2.023   | 22.840  | 37.140  |
| Coefficient of Variation(CV)=   |                                     | 0.791  | 0.187  | 0.845   | 0.628   | 0.956   | 0.898   |
| Error Check, Blank if No Errors Detected  |                                     |  |  |   |   |   |   |
| Trend ≥ 80% Confidence Level  |                                     | INCREASING   | INCREASING   | No Trend  | No Trend  | INCREASING  | INCREASING  |
| Trend ≥ 90% Confidence Level  |                                     | No Trend   | INCREASING   | No Trend  | No Trend  | INCREASING  | No Trend  |
| Trend ≥ 95% Confidence Level  |                                     | No Trend   | No Trend   | No Trend  | No Trend  | INCREASING  | No Trend  |
| Stability Test, If No Trend Exists at 80% Confidence Level  |                                     | NA   | NA   | CV ≤ 1<br>STABLE  | CV ≤ 1<br>STABLE  | NA  | NA  |
| Data Entry By = PWS   |                                     | Date = 16-Jul-10   |  | Checked By = WAN  |   |   |   |



**ATTACHMENT B**  
**Mann-Kendall Analysis of MNA Data 3Q08 through 2Q10**  
**Monitoring Well CPA-MW-4**

| State of Wisconsin<br>Department of Natural Resources<br>Remediation and Redevelopment Program  |                                     |  | Mann-Kendall Statistical Test<br>Form 4400-215 (2/2001)                                  |  |  |  |  |
|---|-------------------------------------|--|--|--|--|--|--|
| <b>Notice:</b> This form is the DNR supplied spreadsheet referenced in Appendices A of Comm 46 and NR 746, Wis. Adm. Code. It is provided to consultants as an optional tool for groundwater contaminant trend analysis to support site closure requests under s. Comm 46.07, Comm 46.08, NR 746.07, NR 746.08, Wis. Adm. Code. Use this form or a manual method when seeking case closure under those rules. Earlier versions of this form should not be used.   |                                     |  | <b>Revised to Evaluate Trend at <math>\geq 95\%</math> Confidence Level</b>              |  |  |  |  |
| <b>Instructions:</b> Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values. |                                     |  |  |  |  |  |  |
| Site Name = Solutia W GK Site   |                                     |  | BRRTS No. =  |  | Well Number = CPAMW04  |  |  |
| Compound ->   |                                     | Benzene  | Mono-chlorobenzene   | 1,2-DCB  | 1,3-DCB  | 1,4-DCB  | Total DCB  |
| Event Number  | Sampling Date<br>(most recent last) | Concentration<br>(blank if no data;<br><span style="color: red;">Red if ND used</span> ) | Concentration<br>(blank if no data;<br><span style="color: red;">Red if ND used</span> ) | Concentration<br>(blank if no data;<br><span style="color: red;">Red if ND used</span> ) | Concentration<br>(blank if no data;<br><span style="color: red;">Red if ND used</span> ) | Concentration<br>(blank if no data;<br><span style="color: red;">Red if ND used</span> ) | Concentration<br>(blank if no data;<br><span style="color: red;">Red if ND used</span> ) |
| 1   | 25-Aug-08                           | 610  | 870  | 4  | 10   | 6  | 10   |
| 2   | 21-Nov-08                           | 810  | 220  | 18   | 10   | 21   | 49   |
| 3   | 25-Feb-09                           | 30   | 1,100  | 15   | 10   | 18   | 43   |
| 4   | 18-Aug-09                           | 12   | 1,100  | 14   | 10   | 19   | 43   |
| 5   | 15-Feb-10                           | 37   | 800  | 23   | 10   | 35   | 68   |
| 6   |                                     |  |  |  |  |  |  |
| 7   |                                     |  |  |  |  |  |  |
| 8   |                                     |  |  |  |  |  |  |
| 9   |                                     |  |  |  |  |  |  |
| 10  |                                     |  |  |  |  |  |  |
| Mann Kendall Statistic (S) =  |                                     | -4.0   | 1.0  | 4.0  | 0.0  | 6.0  | 5.0  |
| Number of Rounds (n) =  |                                     | 5  | 5  | 5  | 5  | 5  | 5  |
| Average =   |                                     | 299.80   | 818.00   | 14.88  | 10.00  | 19.78  | 42.66  |
| Standard Deviation =  |                                     | 381.187  | 360.444  | 6.824  | 0.000  | 10.363   | 20.795   |
| Coefficient of Variation(CV)=   |                                     | 1.271  | 0.441  | 0.459  | 0.000  | 0.524  | 0.487  |
| Error Check, Blank if No Errors Detected  |                                     |  |  |  |  |  |  |
| Trend $\geq 80\%$ Confidence Level  |                                     | No Trend   | No Trend   | No Trend   | No Trend   | INCREASING   | INCREASING   |
| Trend $\geq 90\%$ Confidence Level  |                                     | No Trend   | No Trend   | No Trend   | No Trend   | No Trend   | No Trend   |
| Trend $\geq 95\%$ Confidence Level  |                                     | No Trend   | No Trend   | No Trend   | No Trend   | No Trend   | No Trend   |
| Stability Test, If No Trend Exists at 80% Confidence Level  |                                     | <span style="color: red;">CV &gt; 1<br/>NON-STABLE</span>                                | <span style="color: blue;">CV &lt;= 1<br/>STABLE</span>                                  | <span style="color: blue;">CV &lt;= 1<br/>STABLE</span>                                  | <span style="color: blue;">CV &lt;= 1<br/>STABLE</span>                                  | NA   | NA   |
| Data Entry By = PWS   |                                     | Date = 16-Jul-10   |  | Checked By = WAN   |  |  |  |



**ATTACHMENT B**  
**Mann-Kendall Analysis of MNA Data 3Q08 through 2Q10**  
**Monitoring Well CPA-MW-5**

| State of Wisconsin<br>Department of Natural Resources<br>Remediation and Redevelopment Program  |  |   | Mann-Kendall Statistical Test<br>Form 4400-215 (2/2001)                      |   |   |   |   |
|---|--|---|--|---|---|---|---|
| <p><b>Notice:</b> This form is the DNR supplied spreadsheet referenced in Appendices A of Comm 46 and NK 746, Wis. Adm. Code. It is provided to consultants as an optional tool for groundwater contaminant trend analysis to support site closure requests under s. Comm 46.07, Comm 46.08, NR 746.07, NR 746.08, Wis. Adm. Code. Use this form or a manual method when seeking case closure under those rules. Earlier versions of this form should not be used.</p> <p><b>Instructions:</b> Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values.</p> |  |   |  |   |   |   |   |
| Site Name = Solutia WGK Site  |  |   | BRTS No. =   |   | Well Number = CPAMW05   |   |   |
| Event Number  | Compound -><br>Sampling Date<br>(most recent last) | Benzene<br>Concentration<br>(blank if no data;<br>Red if ND used) | Mono-chlorobenzene<br>Concentration<br>(blank if no data;<br>Red if ND used) | 1,2-DCB<br>Concentration<br>(blank if no data;<br>Red if ND used) | 1,3-DCB<br>Concentration<br>(blank if no data;<br>Red if ND/2 used) | 1,4-DCB<br>Concentration<br>(blank if no data;<br>Red if ND used) | Total DCB<br>Concentration<br>(blank if no data;<br>Red if ND used) |
| 1   | 26-Aug-08  | 5   | 850  | 6   | 10  | 5   | 21  |
| 2   | 24-Nov-08  | 15  | 1,400  | 10  | 10  | 10  | 30  |
| 3   | 26-Aug-09  | 10  | 1,500  | 10  | 10  | 13  | 33  |
| 4   | 16-Feb-10  | 10  | 1,700  | 130   | 11  | 100   | 241   |
| 5   |  |   |  |   |   |   |   |
| 6   |  |   |  |   |   |   |   |
| 7   |  |   |  |   |   |   |   |
| 8   |  |   |  |   |   |   |   |
| 9   |  |   |  |   |   |   |   |
| 10  |  |   |  |   |   |   |   |
| Mann Kendall Statistic (S) =  |  | 1.0   | 6.0  | 5.0   | 3.0   | 6.0   | 6.0   |
| Number of Rounds (n) =  |  | 4   | 4  | 4   | 4   | 4   | 4   |
| Average =   |  | 10.00   | 1362.50  | 39.03   | 10.25   | 32.05   | 81.33   |
| Standard Deviation =  |  | 4.082   | 363.719  | 60.678  | 0.500   | 45.414  | 106.566   |
| Coefficient of Variation(CV)=   |  | 0.408   | 0.267  | 1.555   | 0.049   | 1.417   | 1.310   |
| Error Check, Blank if No Errors Detected  |  |   |  |   |   |   |   |
| Trend ≥ 80% Confidence Level  |  | No Trend  | INCREASING   | INCREASING  | No Trend  | INCREASING  | INCREASING  |
| Trend ≥ 90% Confidence Level  |  | No Trend  | INCREASING   | No Trend  | No Trend  | INCREASING  | INCREASING  |
| Trend ≥ 95% Confidence Level  |  | No Trend  | INCREASING   | No Trend  | No Trend  | INCREASING  | INCREASING  |
| Stability Test, If No Trend Exists at 80% Confidence Level  |  | CV ≤ 1<br>STABLE  | NA   | NA  | CV ≤ 1<br>STABLE  | NA  | NA  |
| Data Entry By =   |  | PWS   | Date =   | 16-Jul-10   | Checked By =  | WAN   |   |

## **Attachment C**



**ATTACHMENT C**  
**Evaluation of MNA Data 3Q08 through 2Q10**  
**Trends by Quarter and over Distance**

| Location | Point ID | Quarterly Effort | Sample Date | Water Level (Elev. ft.) | Distance (feet)            | Benzene (ug/L) | Monochlorobenzene (ug/L) | 1,2-Dichlorobenzene (ug/L) | 1,3-Dichlorobenzene (ug/L) | 1,4-Dichlorobenzene (ug/L) | Total Dichlorobenzene (ug/L) | 1,2,4-Trichlorobenzene (ug/L) |
|----------|----------|------------------|-------------|-------------------------|----------------------------|----------------|--------------------------|----------------------------|----------------------------|----------------------------|------------------------------|-------------------------------|
| BSA-MW-1 | PS05     | 2008 3rd Quarter | 8/26/2008   | 11.62                   | 0                          | 1,000,000      | 2,500                    | 2,500                      | 2,500                      | 2,500                      | 7,500                        |                               |
| BSA-MW-2 | PS08     | 2008 3rd Quarter | 8/21/2008   | 15.10                   | 1,060                      | 18,000         | 1,700                    | 100                        | 100                        | 100                        | 300                          |                               |
|          |          |                  |             |                         | Reduction Rate (m)         | 0.00012        | 1/cm                     |                            |                            |                            |                              |                               |
|          |          |                  |             |                         | COI Vel. (v <sub>c</sub> ) | 0.00006        | cm/sec                   |                            |                            |                            |                              |                               |
|          |          |                  |             |                         | Degradation Rate (k)       | 0.0007         | 1/day                    |                            |                            |                            |                              |                               |
| CPA-MW-1 | PS03     | 2008 3rd Quarter | 8/26/2008   | 7.45                    | 0                          | 3,100          | 15,000                   | 22,000                     | 1,400                      | 12,000                     | 35,400                       |                               |
| CPA-MW-2 | PS04     | 2008 3rd Quarter | 8/26/2008   | 8.28                    | 840                        | 3,200          | 33,000                   | 500                        | 270                        | 9,100                      | 9,870                        |                               |
| CPA-MW-3 | PS07     | 2008 3rd Quarter | 8/21/2008   | 10.80                   | 2215                       | 25             | 460                      | 4                          | 2                          | 6                          | 13                           |                               |
| CPA-MW-4 | PS11     | 2008 3rd Quarter | 8/25/2008   | 25.37                   | 3,660                      | 610            | 870                      | 4                          | 1                          | 6                          | 11                           |                               |
|          |          |                  |             |                         | Reduction Rate (m)         | 0.00003        | 0.00004                  | 0.00008                    | 0.00007                    | 0.00008                    | 1/cm                         |                               |
|          |          |                  |             |                         | COI Vel. (v <sub>c</sub> ) | 0.00006        | 0.00003                  | 0.00002                    | 0.00002                    | 0.00002                    | cm/sec                       |                               |
|          |          |                  |             |                         | Degradation Rate (k)       | 0.0001         | 0.0001                   | 0.0001                     | 0.0001                     | 0.0001                     | 1/day                        |                               |
| BSA-MW-1 | PS05     | 2008 4th Quarter | 11/20/2008  | 16.00                   | 0                          | 1,200,000      | 5,000                    | 5,000                      | 5,000                      | 5,000                      | 15,000                       |                               |
| BSA-MW-2 | PS08     | 2008 4th Quarter | 11/24/2008  | 20.31                   | 1,060                      | 16,000         | 2,500                    | 100                        | 100                        | 100                        | 300                          |                               |
|          |          |                  |             |                         | Reduction Rate (m)         | 0.00013        | 1/cm                     |                            |                            |                            |                              |                               |
|          |          |                  |             |                         | COI Vel. (v <sub>c</sub> ) | 0.00006        | cm/sec                   |                            |                            |                            |                              |                               |
|          |          |                  |             |                         | Degradation Rate (k)       | 0.0008         | 1/day                    |                            |                            |                            |                              |                               |
| CPA-MW-1 | PS03     | 2008 4th Quarter | 11/20/2008  | 11.07                   | 0                          | 3,200          | 13,000                   | 22,000                     | 1,400                      | 12,000                     | 35,400                       |                               |
| CPA-MW-2 | PS04     | 2008 4th Quarter | 11/20/2008  | 12.54                   | 840                        | 2,000          | 33,000                   | 2,400                      | 640                        | 14,000                     | 17,040                       |                               |
| CPA-MW-3 | PS07     | 2008 4th Quarter | 11/24/2008  | 15.44                   | 2215                       | 53             | 420                      | 13                         | 1                          | 16                         | 30                           |                               |
| CPA-MW-4 | PS11     | 2008 4th Quarter | 11/21/2008  | 29.55                   | 3,660                      | 810            | 220                      | 18                         | 5                          | 21                         | 44                           |                               |
|          |          |                  |             |                         | Reduction Rate (m)         | 0.00002        | 0.00005                  | 0.00007                    | 0.00006                    | 0.00010                    | 1/cm                         |                               |
|          |          |                  |             |                         | COI Vel. (v <sub>c</sub> ) | 0.00006        | 0.00003                  | 0.00002                    | 0.00002                    | 0.00002                    | cm/sec                       |                               |
|          |          |                  |             |                         | Degradation Rate (k)       | 0.0001         | 0.0001                   | 0.0001                     | 0.0001                     | 0.0002                     | 1/day                        |                               |
| BSA-MW-1 | PS05     | 2009 1st Quarter | 3/2/2009    | 17.82                   | 0                          | 830,000        | 2,500                    | 2,500                      | 2,500                      | 2,500                      | 7,500                        | 4.85                          |
| BSA-MW-2 | PS08     | 2009 1st Quarter | 2/26/2009   | 22.27                   | 1,060                      | 20,000         | 2,900                    | 100                        | 100                        | 5                          | 205                          | 4.85                          |
|          |          |                  |             |                         | Reduction Rate (m)         | 0.00011        | 1/cm                     |                            |                            |                            |                              |                               |
|          |          |                  |             |                         | COI Vel. (v <sub>c</sub> ) | 0.00006        | cm/sec                   |                            |                            |                            |                              |                               |
|          |          |                  |             |                         | Degradation Rate (k)       | 0.0006         | 1/day                    |                            |                            |                            |                              |                               |
| CPA-MW-1 | PS03     | 2009 1st Quarter | 3/2/2009    | 12.41                   | 0                          | 4,200          | 16,000                   | 20,000                     | 1,400                      | 12,000                     | 33,400                       | 660                           |
| CPA-MW-2 | PS04     | 2009 1st Quarter | 3/2/2009    | 14.07                   | 840                        | 820            | 31,000                   | 3,000                      | 720                        | 17,000                     | 20,720                       | 4.85                          |
| CPA-MW-3 | PS07     | 2009 1st Quarter | 2/26/2009   | 16.75                   | 2215                       | 86             | 460                      | 11                         | 3                          | 16                         | 30                           | 4.7                           |
| CPA-MW-4 | PS11     | 2009 1st Quarter | 2/25/2009   | 29.80                   | 3,660                      | 30             | 1,100                    | 15                         | 5                          | 18                         | 38                           | 4.85                          |
|          |          |                  |             |                         | Reduction Rate (m)         | 0.00005        | 0.00003                  | 0.00007                    | 0.00006                    | 0.00007                    | 1/cm                         |                               |
|          |          |                  |             |                         | COI Vel. (v <sub>c</sub> ) | 0.00006        | 0.00003                  | 0.00002                    | 0.00002                    | 0.00002                    | cm/sec                       |                               |
|          |          |                  |             |                         | Degradation Rate (k)       | 0.0002         | 0.0001                   | 0.0001                     | 0.0001                     | 0.0001                     | 1/day                        |                               |



**ATTACHMENT C**  
**Evaluation of MNA Data 3Q08 through 2Q10**  
**Trends by Quarter and over Distance**

| Location | Point ID | Quarterly Effort | Sample Date | Water Level (Elev. ft.) | Distance (feet)            | Benzene (ug/L) | Monochlorobenzene (ug/L) | 1,2-Dichlorobenzene (ug/L) | 1,3-Dichlorobenzene (ug/L) | 1,4-Dichlorobenzene (ug/L) | Total Dichlorobenzene (ug/L) | 1,2,4-Trichlorobenzene (ug/L) |
|----------|----------|------------------|-------------|-------------------------|----------------------------|----------------|--------------------------|----------------------------|----------------------------|----------------------------|------------------------------|-------------------------------|
| BSA-MW-1 | PS05     | 2009 2nd Quarter | 6/4/2009    | 10.48                   | 0                          | 780,000        | 2,500                    | 2,500                      | 2,500                      | 2,500                      | 7,500                        |                               |
| BSA-MW-2 | PS08     | 2009 2nd Quarter | 6/3/2009    | 13.05                   | 1,060                      | 45,000         | 2,400                    | 100                        | 100                        | 100                        | 300                          |                               |
|          |          |                  |             |                         | Reduction Rate (m)         | 0.00009        | 1/cm                     |                            |                            |                            |                              |                               |
|          |          |                  |             |                         | COI Vel. (v <sub>c</sub> ) | 0.00006        | cm/sec                   |                            |                            |                            |                              |                               |
|          |          |                  |             |                         | Degradation Rate (k)       | 0.0005         | 1/day                    |                            |                            |                            |                              |                               |
| CPA-MW-1 | PS03     | 2009 2nd Quarter | 6/8/2009    | 6.75                    | 0                          | 3,300          | 17,000                   | 29,000                     | 1,800                      | 16,000                     | 46,800                       |                               |
| CPA-MW-2 | PS04     | 2009 2nd Quarter | 6/8/2009    | 6.87                    | 840                        | 320            | 37,000                   | 420                        | 350                        | 11,000                     | 11,770                       |                               |
| CPA-MW-3 | PS07     | 2009 2nd Quarter | 6/3/2009    | 7.35                    | 2215                       | 27             | 500                      | 6                          | 3                          | 9                          | 17                           |                               |
| CPA-MW-4 | PS11     | 2009 2nd Quarter | 6/3/2009    | 17.37                   | 3,660                      | 15             | 1,700                    | 8                          | 5                          | 12                         | 25                           |                               |
|          |          |                  |             |                         | Reduction Rate (m)         | 0.00005        | 0.00003                  | 0.00008                    | 0.00006                    | 0.00008                    | 1/cm                         |                               |
|          |          |                  |             |                         | COI Vel. (v <sub>c</sub> ) | 0.00006        | 0.00003                  | 0.00002                    | 0.00002                    | 0.00002                    | cm/sec                       |                               |
|          |          |                  |             |                         | Degradation Rate (k)       | 0.0003         | 0.0001                   | 0.0001                     | 0.0001                     | 0.0001                     | 1/day                        |                               |
| BSA-MW-1 | PS05     | 2009 2nd Quarter | 6/4/2009    | 10.48                   | 0                          | 940,000        | 2,500                    | 2,500                      | 2,500                      | 2,500                      | 7,500                        | 4.7                           |
| BSA-MW-2 | PS08     | 2009 2nd Quarter | 6/3/2009    | 13.05                   | 1,060                      | 72,000         | 5,000                    | 100                        | 100                        | 100                        | 300                          | 4.7                           |
|          |          |                  |             |                         | Reduction Rate (m)         | 0.00008        |                          |                            |                            |                            |                              |                               |
|          |          |                  |             |                         | COI Vel. (v <sub>c</sub> ) | 0.00006        |                          |                            |                            |                            |                              |                               |
|          |          |                  |             |                         | Degradation Rate (k)       | 0.0004         |                          |                            |                            |                            |                              |                               |
| CPA-MW-1 | PS03     | 2009 2nd Quarter | 6/8/2009    | 6.75                    | 0                          | 5,000          | 16,000                   | 18,000                     | 1,200                      | 11,000                     | 30,200                       | 740                           |
| CPA-MW-2 | PS04     | 2009 2nd Quarter | 6/8/2009    | 6.87                    | 840                        | 1,100          | 30,000                   | 2,100                      | 600                        | 15,000                     | 17,700                       | 4.7                           |
| CPA-MW-3 | PS07     | 2009 2nd Quarter | 6/3/2009    | 7.35                    | 2215                       | 44             | 510                      | 12                         | 1                          | 17                         | 30                           | 4.7                           |
| CPA-MW-4 | PS11     | 2009 2nd Quarter | 6/3/2009    | 17.37                   | 3,660                      | 12             | 1,100                    | 14                         | 5                          | 19                         | 33                           | 4.7                           |
|          |          |                  |             |                         | Reduction Rate (m)         | 0.00006        | 0.00003                  | 0.00007                    | 0.00006                    | 0.00007                    | 1/cm                         |                               |
|          |          |                  |             |                         | COI Vel. (v <sub>c</sub> ) | 0.00006        | 0.00003                  | 0.00002                    | 0.00002                    | 0.00002                    | cm/sec                       |                               |
|          |          |                  |             |                         | Degradation Rate (k)       | 0.0003         | 0.0001                   | 0.0001                     | 0.0001                     | 0.0001                     | 1/day                        |                               |
| BSA-MW-1 | PS05     | 2009 2nd Quarter | 6/4/2009    | 10.48                   | 0                          | 600,000        | 2,500                    | 2,500                      | 2,500                      | 2,500                      | 7,500                        |                               |
| BSA-MW-2 | PS08     | 2009 2nd Quarter | 6/3/2009    | 13.05                   | 1,060                      | 69,000         | 2,600                    | 500                        | 500                        | 500                        | 1,500                        |                               |
|          |          |                  |             |                         | Reduction Rate (m)         | 0.00007        |                          |                            |                            |                            |                              |                               |
|          |          |                  |             |                         | COI Vel. (v <sub>c</sub> ) | 0.00006        |                          |                            |                            |                            |                              |                               |
|          |          |                  |             |                         | Degradation Rate (k)       | 0.0004         |                          |                            |                            |                            |                              |                               |
| CPA-MW-1 | PS03     | 2009 2nd Quarter | 6/8/2009    | 6.75                    | 0                          | 6,000          | 15,000                   | 18,000                     | 1,300                      | 11,000                     | 30,300                       |                               |
| CPA-MW-2 | PS04     | 2009 2nd Quarter | 6/8/2009    | 6.87                    | 840                        | 710            | 26,000                   | 1,800                      | 500                        | 13,000                     | 15,300                       |                               |
| CPA-MW-3 | PS07     | 2009 2nd Quarter | 6/3/2009    | 7.35                    | 2215                       | 3              | 520                      | 13                         | 3                          | 20                         | 33                           |                               |
| CPA-MW-4 | PS11     | 2009 2nd Quarter | 6/3/2009    | 17.37                   | 3,660                      | 5              | 750                      | 12                         | 5                          | 19                         | 31                           |                               |
|          |          |                  |             |                         | Reduction Rate (m)         | 0.00007        | 0.00004                  | 0.00007                    | 0.00006                    | 0.00007                    | 1/cm                         |                               |
|          |          |                  |             |                         | COI Vel. (v <sub>c</sub> ) | 0.00006        | 0.00003                  | 0.00002                    | 0.00002                    | 0.00002                    | cm/sec                       |                               |
|          |          |                  |             |                         | Degradation Rate (k)       | 0.0004         | 0.0001                   | 0.0001                     | 0.0001                     | 0.0001                     | 1/day                        |                               |



**ATTACHMENT C**  
**Evaluation of MNA Data 3Q08 through 2Q10**  
**Trends by Quarter and over Distance**

| Location | Point ID | Quarterly Effort | Sample Date | Water Level (Elev, ft.) | Distance (feet)            | Benzene (ug/L) | Monochlorobenzene (ug/L) | 1,2-Dichlorobenzene (ug/L) | 1,3-Dichlorobenzene (ug/L) | 1,4-Dichlorobenzene (ug/L) | Total Dichlorobenzene (ug/L) | 1,2,4-Trichlorobenzene (ug/L) |
|----------|----------|------------------|-------------|-------------------------|----------------------------|----------------|--------------------------|----------------------------|----------------------------|----------------------------|------------------------------|-------------------------------|
| BSA-MW-1 | PS05     | 2009 2nd Quarter | 6/4/2009    | 10.48                   | 0                          | 730,000        | 2,500                    | 2,500                      | 2,500                      | 2,500                      | 7,500                        | 4.85                          |
| BSA-MW-2 | PS08     | 2009 2nd Quarter | 6/3/2009    | 13.05                   | 1,060                      | 150,000        | 2,700                    | 500                        | 500                        | 500                        | 1,500                        | 4.75                          |
|          |          |                  |             |                         | Reduction Rate (m)         | 0.00005        |                          |                            |                            |                            |                              |                               |
|          |          |                  |             |                         | COI Vel. (v <sub>c</sub> ) | 0.00006        |                          |                            |                            |                            |                              |                               |
|          |          |                  |             |                         | Degradation Rate (k)       | 0.0003         |                          |                            |                            |                            |                              |                               |
| CPA-MW-1 | PS03     | 2009 2nd Quarter | 6/8/2009    | 6.75                    | 0                          | 7,300          | 18,000                   | 22,000                     | 1,700                      | 14,000                     | 37,700                       | 870                           |
| CPA-MW-2 | PS04     | 2009 2nd Quarter | 6/8/2009    | 6.87                    | 840                        | 1,100          | 29,000                   | 2,700                      | 670                        | 16,000                     | 19,370                       | 4.85                          |
| CPA-MW-3 | PS07     | 2009 2nd Quarter | 6/3/2009    | 7.35                    | 2215                       | 180            | 660                      | 37                         | 5                          | 64                         | 106                          | 5                             |
| CPA-MW-4 | PS11     | 2009 2nd Quarter | 6/3/2009    | 17.37                   | 3,660                      | 37             | 800                      | 23                         | 5                          | 35                         | 58                           | 4.7                           |
|          |          |                  |             |                         | Reduction Rate (m)         | 0.00005        | 0.00004                  | 0.00007                    | 0.00006                    | 0.00006                    | 1/cm                         |                               |
|          |          |                  |             |                         | COI Vel. (v <sub>c</sub> ) | 0.00006        | 0.00003                  | 0.00002                    | 0.00002                    | 0.00002                    | cm/sec                       |                               |
|          |          |                  |             |                         | Degradation Rate (k)       | 0.0002         | 0.0001                   | 0.0001                     | 0.0001                     | 0.0001                     | 1/day                        |                               |
| BSA-MW-1 | PS05     | 2010 2nd Quarter | 5/19/2010   | 11.05                   | 0                          | 840,000        | 2,500                    | 2,500                      | 2,500                      | 2,500                      | 7,500                        |                               |
| BSA-MW-2 | PS08     | 2010 2nd Quarter | 5/25/2010   | 14.00                   | 1,060                      | 120,000        | 1,300                    | 500                        | 500                        | 500                        | 1,300                        |                               |
|          |          |                  |             |                         | Reduction Rate (m)         | 0.00008        |                          |                            |                            |                            |                              |                               |
|          |          |                  |             |                         | COI Vel. (v <sub>c</sub> ) | 0.00006        |                          |                            |                            |                            |                              |                               |
|          |          |                  |             |                         | Degradation Rate (k)       | 0.0004         |                          |                            |                            |                            |                              |                               |
| CPA-MW-1 | PS03     | 2010 2nd Quarter | 5/20/2010   | 6.99                    | 0                          | 7,200          | 16,000                   | 18,000                     | 1,400                      | 11,000                     | 46,400                       |                               |
| CPA-MW-2 | PS04     | 2010 2nd Quarter | 5/20/2010   | 7.13                    | 840                        | 100            | 30,000                   | 440                        | 290                        | 8,500                      | 39,230                       |                               |
| CPA-MW-3 | PS07     | 2010 2nd Quarter | 5/26/2010   | 8.35                    | 2215                       | 87             | 560                      | 55                         | 5.6                        | 56                         | 677                          |                               |
| CPA-MW-4 | PS11     | 2010 2nd Quarter | 5/24/2010   | 19.49                   | 3,660                      | 39             | 920                      | 42                         | 5                          | 40                         | 1,002                        |                               |
|          |          |                  |             |                         | Reduction Rate (m)         | 0.00004        | 0.00003                  | 0.00005                    | 0.00006                    | 0.00006                    | 1/cm                         |                               |
|          |          |                  |             |                         | COI Vel. (v <sub>c</sub> ) | 0.00006        | 0.00003                  | 0.00002                    | 0.00002                    | 0.00002                    | cm/sec                       |                               |
|          |          |                  |             |                         | Degradation Rate (k)       | 0.0002         | 0.0001                   | 0.0001                     | 0.0001                     | 0.0001                     | 1/day                        |                               |



**ATTACHMENT C**  
**Evaluation of MNA Data 3Q08 through 2Q10**  
**Trends by Quarter and over Distance**

| Location | Point ID | Quarterly Effort | Nitrogen, Nitrate (mg/L) | Sulfate as SO4 (mg/L) | Alkalinity (mg/L) | Carbon Dioxide (mg/L) | Methane (ug/L) | Methane (mg/L) | Dissolved Oxygen (mg/L) | ORP (mV) | Total Iron (mg/L) | Dissolved Iron (mg/L)<br>Assumed to be Fe <sup>2+</sup> | Total Iron - Fe <sup>2+</sup> (mg/L)<br>Assumed to be Fe <sup>3+</sup> |
|----------|----------|------------------|--------------------------|-----------------------|-------------------|-----------------------|----------------|----------------|-------------------------|----------|-------------------|---|--|
| BSA-MW-1 | PS05     | 2008 3rd Quarter | 0.03                     | 130                   | 870               | 21                    | 10,000         | 10             | 0.57                    | -145.1   | 3.0               | 1.2   | 1.8  |
| BSA-MW-2 | PS08     | 2008 3rd Quarter | 0.03                     | 130                   | 710               | 26                    | 3,600          | 4              | 0.06                    | 35.8     | 2.9               | 1.3   | 1.6  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
| CPA-MW-1 | PS03     | 2008 3rd Quarter | 0.25                     | 14                    | 1,200             | 1                     | 21,000         | 21             | 0                       | -21.1    | 2.6               | 1.8   | 0.8  |
| CPA-MW-2 | PS04     | 2008 3rd Quarter | 0.03                     | 2.5                   | 640               | 18                    | 7,400          | 7              | 6.46                    | -105.6   | 5.8               | 5.5   | 0.3  |
| CPA-MW-3 | PS07     | 2008 3rd Quarter | 0.03                     | 12.5                  | 690               | 48                    | 8,800          | 9              | 0.29                    | 1.9      | 18.0              | 18.0  | 0.0  |
| CPA-MW-4 | PS11     | 2008 3rd Quarter | 0.03                     | 2.5                   | 830               | 27                    | 12,000         | 12             | 0.63                    | -147.7   | 13.0              | 12.0  | 1.0  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
| BSA-MW-1 | PS05     | 2008 4th Quarter | 0.03                     | 2.5                   | 930               | 32                    | 5,800          | 6              | 6.87                    | -130.7   | 2.5               | 2.1   | 0.4  |
| BSA-MW-2 | PS08     | 2008 4th Quarter | 0.03                     | 110                   | 660               | 29                    | 3,300          | 3              | 5.8                     | -112     | 1.8               | 1.7   | 0.1  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
| CPA-MW-1 | PS03     | 2008 4th Quarter | 0.25                     | 13                    | 1,100             | 2                     | 15,000         | 15             | 0.25                    | 2.5      | 1.7               | 1.4   | 0.3  |
| CPA-MW-2 | PS04     | 2008 4th Quarter | 0.03                     | 2.5                   | 620               | 40                    | 1,400          | 1              | 6.92                    | 104.8    | 5.3               | 5.1   | 0.2  |
| CPA-MW-3 | PS07     | 2008 4th Quarter | 0.03                     | 3                     | 690               | 56                    | 33,000         | 33             | 6.09                    | -87      | 15.0              | 15.0  | 0.0  |
| CPA-MW-4 | PS11     | 2008 4th Quarter | 0.03                     | 2.5                   | 770               | 15                    | 9,000          | 9              | 6.39                    | -112.2   | 13.0              | 13.0  | 0.0  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
| BSA-MW-1 | PS05     | 2009 1st Quarter | 0.13                     | 2.5                   | 850               | 22                    | 11,000         | 11             | 10.24                   | -150.8   | 1.3               | 1.1   | 0.2  |
| BSA-MW-2 | PS08     | 2009 1st Quarter | 0.03                     | 160                   | 700               | 17                    | 3,200          | 3              | 7.13                    | -166.3   | 1.4               | 1.3   | 0.1  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
| CPA-MW-1 | PS03     | 2009 1st Quarter | 0.25                     | 5.7                   | 1,100             | 3                     | 30,000         | 30             | 9.26                    | -123.6   | 1.5               | 1.0   | 0.5  |
| CPA-MW-2 | PS04     | 2009 1st Quarter | 0.03                     | 2.5                   | 610               | 25                    | 2,800          | 3              | 13.43                   | -144     | 6.1               | 5.2   | 0.9  |
| CPA-MW-3 | PS07     | 2009 1st Quarter | 0.03                     | 3                     | 690               | 49                    | 30,000         | 30             | 6.15                    | -150.8   | 13.0              | 14.0  | 0.0  |
| CPA-MW-4 | PS11     | 2009 1st Quarter | 0.03                     | 72                    | 810               | 23                    | 48,000         | 48             | 4.95                    | -171.6   | 14.0              | 13.0  | 1.0  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |



**ATTACHMENT C**  
**Evaluation of MNA Data 3Q08 through 2Q10**  
**Trends by Quarter and over Distance**

| Location | Point ID | Quarterly Effort | Nitrogen, Nitrate (mg/L) | Sulfate as SO4 (mg/L) | Alkalinity (mg/L) | Carbon Dioxide (mg/L) | Methane (ug/L) | Methane (mg/L) | Dissolved Oxygen (mg/L) | ORP (mV) | Total Iron (mg/L) | Dissolved Iron (mg/L)<br>Assumed to be Fe <sup>2+</sup> | Total Iron - Fe <sup>2+</sup> (mg/L)<br>Assumed to be Fe <sup>3+</sup> |
|----------|----------|------------------|--------------------------|-----------------------|-------------------|-----------------------|----------------|----------------|-------------------------|----------|-------------------|---|--|
| BSA-MW-1 | PS05     | 2009 2nd Quarter | 2.5                      | 2.5                   | 960               | 22                    | 5,500          | 6              | 0.75                    | -77      | 1.2               | 0.9   | 0.3  |
| BSA-MW-2 | PS08     | 2009 2nd Quarter | 0.07                     | 2.5                   | 760               | 37                    | 20,000         | 20             | 0.55                    | -79.2    | 1.6               | 1.4   | 0.2  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
| CPA-MW-1 | PS03     | 2009 2nd Quarter | 0.25                     | 15                    | 1,100             | 3                     | 28,000         | 28             | 0.95                    | 40.2     | 2.0               | 1.8   | 0.2  |
| CPA-MW-2 | PS04     | 2009 2nd Quarter | 0.03                     | 2.5                   | 630               | 35                    | 7,200          | 7              | 1.66                    | -50.7    | 4.9               | 4.8   | 0.1  |
| CPA-MW-3 | PS07     | 2009 2nd Quarter | 0.03                     | 0.03                  | 710               | 59                    | 31,000         | 31             | 0.56                    | -104.5   | 15.0              | 15.0  | 0.0  |
| CPA-MW-4 | PS11     | 2009 2nd Quarter | 0.19                     | 2.5                   | 850               | 40                    | 3,200          | 3              | 0.73                    | -117     | 9.5               | 9.5   | 0.0  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
| BSA-MW-1 | PS05     | 2009 2nd Quarter | 0.025                    | 2.5                   | 900               | 12                    | 13,000         | 13             | 4.55                    | -142.2   | 1.8               | 1.6   | 0.2  |
| BSA-MW-2 | PS08     | 2009 2nd Quarter | 0.025                    | 2.5                   | 700               | 18                    | 11,000         | 11             | 1.18                    | -136     | 1.5               | 1.2   | 0.3  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
| CPA-MW-1 | PS03     | 2009 2nd Quarter | 0.025                    | 2.5                   | 1,100             | 3                     | 32,000         | 32             | 2.49                    | 12.2     | 1.5               | 1.5   | 0.0  |
| CPA-MW-2 | PS04     | 2009 2nd Quarter | 0.025                    | 2.5                   | 630               | 14                    | 2,800          | 3              | 4.39                    | -111     | 5.9               | 5.3   | 0.6  |
| CPA-MW-3 | PS07     | 2009 2nd Quarter | 0.025                    | 2.5                   | 690               | 28                    | 32,000         | 32             | 3.66                    | -137.2   | 14.0              | 14.0  | 0.0  |
| CPA-MW-4 | PS11     | 2009 2nd Quarter | 0.025                    | 2.5                   | 850               | 50                    | 5,300          | 5              | 0.83                    | -154.7   | 11.0              | 11.0  | 0.0  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
| BSA-MW-1 | PS05     | 2009 2nd Quarter | 0.025                    | 2.5                   | 790               | 27                    | 15,000         | 15             | 1.57                    | -155.0   | 2.2               | 1.7   | 0.5  |
| BSA-MW-2 | PS08     | 2009 2nd Quarter | 0.025                    | 2.5                   | 670               | 37                    | 15,000         | 15             | 1.12                    | -128     | 1.8               | 1.8   | 0.0  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
| CPA-MW-1 | PS03     | 2009 2nd Quarter | 0.025                    | 7.7                   | 1,000             | 3                     | 32,000         | 32             | 0.62                    | -197.2   | 1.3               | 1.2   | 0.1  |
| CPA-MW-2 | PS04     | 2009 2nd Quarter | 0.025                    | 2.5                   | 530               | 36                    | 2,600          | 3              | 1.75                    | -125.6   | 6.1               | 5.7   | 0.4  |
| CPA-MW-3 | PS07     | 2009 2nd Quarter | 0.025                    | 2.5                   | 640               | 79                    | 36,000         | 36             | 1.57                    | -131.4   | 16.0              | 16.0  | 0.0  |
| CPA-MW-4 | PS11     | 2009 2nd Quarter | 0.025                    | 36                    | 770               | 61                    | 5,100          | 5              | 1.4                     | -168.4   | 10.0              | 10.0  | 0.0  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |



**ATTACHMENT C**  
**Evaluation of MNA Data 3Q08 through 2Q10**  
**Trends by Quarter and over Distance**

| Location | Point ID | Quarterly Effort | Nitrogen, Nitrate (mg/L) | Sulfate as SO4 (mg/L) | Alkalinity (mg/L) | Carbon Dioxide (mg/L) | Methane (ug/L) | Methane (mg/L) | Dissolved Oxygen (mg/L) | ORP (mV) | Total Iron (mg/L) | Dissolved Iron (mg/L)<br>Assumed to be Fe <sup>2+</sup> | Total Iron - Fe <sup>2+</sup> (mg/L)<br>Assumed to be Fe <sup>3+</sup> |
|----------|----------|------------------|--------------------------|-----------------------|-------------------|-----------------------|----------------|----------------|-------------------------|----------|-------------------|---|--|
| BSA-MW-1 | PS05     | 2009 2nd Quarter | 0.025                    | 2.5                   | 920               | 33                    | 8,700          | 9              | 0.06                    | -145.9   | 2.4               | 2.2   | 0.2  |
| BSA-MW-2 | PS08     | 2009 2nd Quarter | 0.025                    | 2.5                   | 700               | 57                    | 9,100          | 9              | 0.09                    | -160.6   | 1.9               | 1.8   | 0.1  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
| CPA-MW-1 | PS03     | 2009 2nd Quarter | 0.025                    | 5.7                   | 1,000             | 2.5                   | 23,000         | 23             | 0.02                    | -66.6    | 1.2               | 1.0   | 0.2  |
| CPA-MW-2 | PS04     | 2009 2nd Quarter | 0.025                    | 2.5                   | 610               | 36                    | 2,200          | 2              | 0.19                    | -122.9   | 6.1               | 6.0   | 0.1  |
| CPA-MW-3 | PS07     | 2009 2nd Quarter | 0.025                    | 2.5                   | 660               | 63                    | 26,000         | 26             | 0.09                    | -137.9   | 15.0              | 14.0  | 1.0  |
| CPA-MW-4 | PS11     | 2009 2nd Quarter | 0.025                    | 2.5                   | 810               | 43                    | 6,000          | 6              | 0.2                     | -148.4   | 9.3               | 9.7   | 0.0  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
| BSA-MW-1 | PS05     | 2010 2nd Quarter | 0.025                    | 2.5                   | 930               | 31                    | 8,400          | 8              | 0.6                     | 123.2    | 1.9               | 1.6   | 0.3  |
| BSA-MW-2 | PS08     | 2010 2nd Quarter | 0.025                    | 2.5                   | 720               | 60                    | 28,000         | 28             | 6.45                    | -92.5    | 3.2               | 3.0   | 0.2  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
| CPA-MW-1 | PS03     | 2010 2nd Quarter | 0.025                    | 2.5                   | 1000              | 2.5                   | 17,000         | 17             | 0.21                    | 248.4    | 1.2               | 0.3   | 0.9  |
| CPA-MW-2 | PS04     | 2010 2nd Quarter | 0.025                    | 2.5                   | 610               | 32                    | 1,800          | 18             | 0.54                    | 169.5    | 5.0               | 4.9   | 0.1  |
| CPA-MW-3 | PS07     | 2010 2nd Quarter | 0.025                    | 2.5                   | 610               | 60                    | 15,000         | 15             | 0.26                    | -98.2    | 14.0              | 12.0  | 2.0  |
| CPA-MW-4 | PS11     | 2010 2nd Quarter | 0.025                    | 2.5                   | 2.5               | 2.5                   | 4,000          | 4              | 6.8                     | 103.4    | 9.5               | 9.1   | 0.4  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |
|          |          |                  |                          |                       |                   |                       |                |                |                         |          |                   |   |  |



**ATTACHMENT C**  
**Evaluation of MNA Degradation 3Q08 through 2Q10**

|  |                     |                            |         |        |       |         |    |         |        |
|--|---------------------|----------------------------|---------|--------|-------|---------|----|---------|--------|
| <b>BSA Plume</b>                       | Averages during MNA | Reduction Rate (m)         | 0.00009 | 1/cm   | Range | 0.00005 | to | 0.00013 | 1/cm   |
|  |                     | COI Vel. (v <sub>c</sub> ) | 0.00006 | cm/sec | Range | 0.00006 | to | 0.00006 | cm/sec |
|  |                     | Degradation Rate (k)       | 0.00051 | 1/day  | Range | 0.00028 | to | 0.00075 | 1/day  |
| <b>CPA Plume - Benzene</b>             | Averages during MNA | Reduction Rate (m)         | 0.00004 | 1/cm   | Range | 0.00002 | to | 0.00007 | 1/cm   |
|  |                     | COI Vel. (v <sub>c</sub> ) | 0.00006 | cm/sec | Range | 0.00006 | to | 0.00006 | cm/sec |
|  |                     | Degradation Rate (k)       | 0.00023 | 1/day  | Range | 0.00010 | to | 0.00036 | 1/day  |
| <b>CPA Plume - Chlorobenzene</b>       | Averages during MNA | Reduction Rate (m)         | 0.00004 | 1/cm   | Range | 0.00003 | to | 0.00005 | 1/cm   |
|  |                     | COI Vel. (v <sub>c</sub> ) | 0.00003 | cm/sec | Range | 0.00003 | to | 0.00003 | cm/sec |
|  |                     | Degradation Rate (k)       | 0.00008 | 1/day  | Range | 0.00007 | to | 0.00010 | 1/day  |
| <b>CPA Plume - 1,2-Dichlorobenzene</b> | Averages during MNA | Reduction Rate (m)         | 0.00007 | 1/cm   | Range | 0.00005 | to | 0.00008 | 1/cm   |
|  |                     | COI Vel. (v <sub>c</sub> ) | 0.00002 | cm/sec | Range | 0.00002 | to | 0.00002 | cm/sec |
|  |                     | Degradation Rate (k)       | 0.00011 | 1/day  | Range | 0.00009 | to | 0.00013 | 1/day  |
| <b>CPA Plume - 1,3-Dichlorobenzene</b> | Averages during MNA | Reduction Rate (m)         | 0.00006 | 1/cm   | Range | 0.00006 | to | 0.00007 | 1/cm   |
|  |                     | COI Vel. (v <sub>c</sub> ) | 0.00002 | cm/sec | Range | 0.00002 | to | 0.00002 | cm/sec |
|  |                     | Degradation Rate (k)       | 0.00011 | 1/day  | Range | 0.00010 | to | 0.00012 | 1/day  |
| <b>CPA Plume - 1,4-Dichlorobenzene</b> | Averages during MNA | Reduction Rate (m)         | 0.00007 | 1/cm   | Range | 0.00006 | to | 0.00010 | 1/cm   |
|  |                     | COI Vel. (v <sub>c</sub> ) | 0.00002 | cm/sec | Range | 0.00002 | to | 0.00002 | cm/sec |
|  |                     | Degradation Rate (k)       | 0.00014 | 1/day  | Range | 0.00011 | to | 0.00020 | 1/day  |